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Astronomy and War

Astronomy, sometimes referred to as the oldest and the most nearly universal of the sciences, usually proceeds serenely along its way unaffected by local and temporary disturbances. The science as such may, indeed, remain aloof and unconcerned with current happenings, but the individuals who contribute to it are subject to the circumstances in which they find themselves. No one, not even an astronomer, is beyond the reach of the consequences of a global, total war. Nor does he wish to be. Rather he is willing and eager to serve wherever his training and ability are needed.

Accordingly, many astronomers have left their homes and their researches for new duties elsewhere. At many observatories the staffs are reduced to such a degree that only the necessary routine can be carried on. The publication of results has been greatly curtailed. The international exchange of ideas, so beneficial and constructive in normal times, has practically ceased. In a word, the recent, rapid progress of astronomical thought has been checked and bids fair to come to a standstill.

More directly astronomy itself has gone to war. In its most elemental aspects it is functioning in a more important manner than is necessary in time of peace. The regularity of the stars, which is another name for astronomy, alone must be relied upon in the last analysis for directions at sea and latterly in the air; and also for furnishing accurate time. The mariner who interprets the movements of the stars wrongly may be delayed in reaching his destination. In peace this may lead to inconvenience, in war to disaster. Plans which are dependent upon factors widely separated on the earth's surface can be successful only as a result of perfect synchronizing. Lacking this, in peace the objective will not be attained and a second attempt is necessary; in war the battle may be irretrievably lost and no second attempt be possible. It is in this sense that astronomy itself has gone to war.

Let us earnestly hope that we are entering upon the final year of this world-wide catastrophe, and that in the near future the friendly stars will shine again upon an orderly world and, coursing silent and majestically, will lead the argosies of the sea and of the air on missions of peace to their appointed havens at their appointed time.

JANUARY 1, 1944.

The Seventy-First Meeting of the American Astronomical Society

By DEAN B. McLAUGHLIN

About three years ago, the secretary of the American Astronomical Society received an amazing document. To reproduce its full text would take too much space, but the essential points were that:

> WHEREAS the centennial anniversary of the laying of the cornerstone of the Cincinnati Observatory will occur on November 9, 1943, and . . .
>
> WHEREAS the Cincinnati Observatory has never celebrated any semi-, sesqui-, bi-, ter-, or any other kind of centennial, . . . and
>
> WHEREAS the Cincinnati Observatory is anxious to celebrate its centennial by entertaining the American Astronomical Society,
>
> THEREFORE we . . . respectfully petition our Council to accept the invitation of the Cincinnati Observatory to hold the September meeting of 1943 at Cincinnati.
>
> (Then followed the signatures of 40 mid-western astronomers.)

Several months later, the Society received a formal invitation from Dr. Elliott Smith, Director of the Cincinnati Observatory. In the meantime, Harvard had appeared as a competitor, for its observatory also had a centennial in the same year. It was therefore tacitly agreed in the Council that the summer meeting would be held at Harvard and the winter one at Cincinnati.

In the second year of the war, however, all bets as to meetings were off, but the success of the Harvard meeting at the end of May, 1943, encouraged Dr. Shapley, the new president of the Society, to inquire timidly whether Cincinnati still wanted us. Evidently they did, and arrangements were made to hold the meeting on the week-end just before the centennial date.

About a month before the Society was due to meet, we were shocked to hear of the sudden death of Dr. Elliott Smith, who would have been our host. Dr. Everett I. Yowell, the recently retired director, stepped into the breach and completed the local arrangements.

Dr. Shapley and the writer left Cambridge on Thursday afternoon, November 4, and arrived in Cincinnati the next afternoon. When they reached the headquarters at the Netherland Plaza Hotel, Drs. Yowell and Herget were there to greet arriving astronomers. The secretary was given a complimentary room on the 14th floor; the president had to pay for his room. Stickers on the window-panes requested the occupant to refrain from throwing bottles from the window.

Registration of members was held in a spacious room on the fourth floor, where the Council met later on. However, it was then found that city time was one hour slower than railroad time, and this gave a breathing spell we had not counted on. Dr. Herget conducted a party to the top of the 48-story tower, from which a fine view was had of the

city and its surroundings.

At five o'clock there was a Council meeting, at which routine business and some special matters were disposed of. Among the special items was a proposal that the Council dinner be paid from Society funds, instead of from personal pocket-books. They voted "No" on it, probably from an overdose of conscience. At about this time there was an earthquake shock at Corinth, where Diogenes died.

The Council dinner was held immediately after the meeting, and after that there was just time to get ready to go to the centennial celebration at Wilson Auditorium on the campus of the University. The Councilors piled into two taxicabs, and the first, manned by a driver who knew the way, went straight there. The second, less informed, tried to follow the first, but got left behind at a traffic light and reached the auditorium only after a complete circumnavigation of the campus.

The program was opened by President Raymond Walters, of the University of Cincinnati. In a few well-chosen words, he welcomed the Society, and then read a letter of greeting from President Roosevelt, in which the hope was expressed that "the work of the Observatory will go steadily forward and the sphere of its influence will ever widen in the decades ahead." At this time, President Walters made the first announcement of the appointment of Dr. Paul Herget as Director of the Cincinnati Observatory, to assume his duties when he returns from his present war work.

Mr. Robert L. Black, a member of the board of directors of the University, followed with a colorful and interesting account of the events of a century ago, when John Quincy Adams journeyed from Massachusetts to Cincinnati, to deliver an address and lay the cornerstone of the observatory that represented the culmination of the Herculean efforts of Ormsby MacKnight Mitchel.

Last on the program was an illustrated lecture by Dr. Shapley on "A Cycle of Astronomy," in which he traced the development of knowledge of the sidereal system and its structure in the century since the founding of Cincinnati Observatory. There was a feeling of suspense on the part of a select few who knew of a transaction that had taken place between Dr. Shapley and one of the Councilors just before leaving the hotel, but everything proceeded without accident.[1]

At the close of the program, a reception for the Society was held in the Annie Laws Memorial Room of Teachers' College. There we had the pleasure of meeting officials of the University and, among other guests of honor, Alice Roosevelt Longworth, daughter of the late "Teddy" and widow of the late Speaker of the House, Nicholas Longworth. It was his grandfather who donated the land on which the

[1] This cryptic statement is for the benefit of the "select few." Other readers will have to remain in the dark until they can get Dr. Shapley or one of the few in a sufficiently talkative mood. There is reported to be a serious shortage of the wherewithal.

original Cincinnati Observatory building was erected, on the hill now known as Mount Adams.

The reception over, we took the street car back to town, and alighted from the car at Sixth and Vine. For the benefit of Philadelphians, it must be remarked that the nomenclature is purely coincidental; it is a different kind of neighborhood in Cincinnati. The secretary went to his room and spent an hour, which should have been devoted to sleep, in perusing the papers of absent authors. He then took an aspirin and went to bed.

After breakfast on Saturday morning, the astronomers took a half-hour ride on the street car to Delta and Erie Avenues, from which corner it was only a short walk to the observatory,—if one knew the way. Stebbins quoted his standard rule for finding an observatory: "Just climb a hill," and it worked.[2]

Dr. Herget welcomed the members and incidentally remarked that some 2000 visitors had been entertained at open nights during the past year. Dr. Shapley, in his response, remarked surprise that 2000 people had found their way to the observatory, because even some good navigators had trouble.

About a dozen papers were presented at the morning session, and most of them were discussed more than has usually been the case at past meetings. At no time was there a feeling that the program had to be speeded up in order to get finished.

The meeting adjourned at noon for the taking of the photograph. Comparisons with pictures of past meetings are invited; we think it is unusually good. A wisecrack at the psychological moment helped. The party then started for the Knox Presbyterian Church a mile or so away, where luncheon was to be served. On the way, several of us stopped to call for a few minutes on Mrs. Elliott Smith.

The luncheon was served by several ladies of the church, and "perfect" is the only adjective to describe it. The pastor, Dr. Edward Stimson, was present, and when asked his height he gave it as 5 feet 18 inches, and followed with a discourse on the inconvenience of such an altitude, particularly in a Pullman berth. He claims he once tried sleeping with his feet out the window, and awoke to find he had captured two mail sacks and a red lantern. We suspect he can tell good ones about the fish that got away, too.

The astronomers walked or rode back to the observatory, and there was an opportunity to see the instruments and the original cornerstone, which was brought from the former observatory building when the observatory was moved to its present site.

At the afternoon session, Dr. Joel Stebbins delivered his retiring presidential address. The title: "The Law of Diminishing Returns,"

[2] At Cincinnati and Pittsburgh, however, one could appropriately ask: "Which hill?", and the rule fails at Princeton.

at least had the secretary fooled. He expected to hear the latest about the absorption of light in space; instead it referred to what can and cannot be done by making instruments larger, or by collecting greater quantities of observations of the same kind already in existence. Perhaps the moral of it was that the greatest progress comes, not so much from working longer hours or getting the same kind of data with larger instruments, but by devising totally new methods of doing the job.

There was a short intermission, and then followed a symposium on "Dwarf Stars and Planet-like Companions," which included papers by Drs. E. I. Yowell, W. J. Luyten, A. N. Vyssotsky, Peter van de Kamp, K. A. Strand, and H. N. Russell,—the last two *in absentia.*

That evening the Society dinner was held at the Netherland Plaza Hotel. After coffee had been served, Dr. Shapley acted as toastmaster and introduced Mayor James Garfield Stewart. The latter gave us some more side-lights on the early days of Cincinnati, and the occasion of John Quincy Adams' address at the laying of the cornerstone of the observatory. But it was so far from being simply a discourse on history that we were convulsed with laughter most of the time. According to the mayor, the Longworths got the land (which Nicholas Longworth donated to the observatory) in exchange for a still, and he suspects it was some of his own ancestors who got the still.

Short speeches were made by Dean George Barbour of the College of Liberal Arts, by Dr. Herget, by Mr. Alfred Hasemeier, president of the Cincinnati Astronomical Society, and by Mr. George Gasper, president of the Cincinnati Astronomical Association. The program was concluded with a resolution of thanks to our hosts, presented by Dr. W. J. Eckert.

The rest of the evening was given over to conversation and relaxation. Small discussion groups gathered about the room,—we suspect that some of them talked shop, but we know others didn't. Some ranged themselves around the piano while van de Kamp played. Considerably later, an unofficial session in the "Frontier Room" was attended by nine members (five of whom were Councilors). Between rounds of refreshments, a special item of business was initiated, and the Council acted on it the next morning. Somewhat after 1:00 A.M., the party broke up, and again the secretary was glad he had a supply of aspirin on hand.

The Council,—some of them a bit bleary-eyed,—met at breakfast in the Coffee Shop on Sunday morning and conducted such business as remained,—to the despair of the waitress, who doubtless wondered if they were going to stay on for lunch.

This is perhaps as good a place as any to list the most noteworthy actions of the Council at Cincinnati. (1) Miss Antonia C. Maury was selected as the fourth recipient of the Annie J. Cannon Prize. (2) Sir H. Spencer Jones was elected to honorary membership. (3) It was de-

cided that the format of the *Astronomical Journal* would be like that of the *Physical Review*. (4) A slate of nominations for the annual election of officers in 1944 was approved. (5) Four new members were elected to the Society.

Right after the Council meeting, the Sunday morning session for papers was held in one of the parlors on the fourth floor of the hotel. The papers were particularly interesting and there was a great deal of discussion. Some members had to leave before the end, in order to catch trains. The program was finished about noon, and the gathering then rather quickly broke up.

The difference between city and railroad time now worked in reverse, and there was just a comfortable amount of time for lunch and preparation for the return journey. Dr. Shapley departed for a luncheon engagement. The secretary and several others stood in line at a neighboring cafeteria for some fifteen minutes before they got within reach of food.

The writer and Dr. Shapley were due to leave on the same train, but when it left the terminal, no Shapley was aboard. But Cincinnati is a big city. New York has its 125th Street, Philadelphia has its North Philadelphia, Boston has its Back Bay, Caesar had his Brutus, Charles the First had his Cromwell,—*how did we get on this subject?*[3] and Cincinnati has its Winton Place. Shapley got on there. A little later we walked through a dozen or so cars and found the Nassaus, with whom we conversed most of the way to Cleveland. The rest of the journey was at night and was uneventful, except for the author's phenomenal record of ten hours of sleep in a Pullman berth, believe it or not.

The Cincinnati meeting was an unqualified success, just as was the Harvard meeting that preceded it. Perhaps we have been in luck, or perhaps it was the fact that both places had a centennial (though Harvard did not celebrate) that helped swell the attendance. More likely it proves that a satisfactory attendance can be expected at meetings, even in wartime. The number of Councilors at Cincinnati was even a little above average. Negotiations have been started for the summer meeting of 1944, and it appears likely that it will be held in Philadelphia. We don't know of anything in Philadelphia that has a centennial in 1944, and wonder if the American Philosophical Society might be persuaded to celebrate a 175th anniversary.

CAMBRIDGE, MASSACHUSETTS, DECEMBER 10, 1943.

[3] Probably from listening to Groucho Marx.

Elliott S. Smith

By EVERETT I. YOWELL

Dr. Elliott S. Smith, director of the Cincinnati Observatory, died on September 29, 1943. In view of the approaching centennial of the Cincinnati Observatory, in which he was deeply interested, and the meeting of the American Astronomical Society in Cincinnati, his death was peculiarly tragic and will be regretted by his many friends.

He was born in Blue Earth County, Minnesota, on January 19, 1875, the son of the Reverend Frank Y. and Amanda Cornish Smith. While he was still a child, his father died and his mother married again. He grew up on a farm and could plough a straight furrow when he was ten years old. He went to high school at Fairmont and then attended the University of Minnesota. There he studied astronomy with Professor F. P. Leavenworth (who had studied with Ormond Stone at Cincinnati and the University of Virginia) and became his assistant in his senior year. He received the B.A. degree in 1903 and then went to Lick Observatory where he was assistant in astronomy and held a fellowship in the University of California in 1905-06. He worked with Professor Tucker on the meridian circle, and Professor Porter put him in charge of our meridian circle in 1907. With this instrument he made the observations for modern positions of the proper motion stars, and reduced most of these observations without assistance. He also took postgraduate work at the University of Cincinnati, receiving the Ph.D. degree in 1910.

At the University of Cincinnati he held successively the positions of Assistant Professor, Associate Professor, and Professor of Astronomy and was made Director of the Observatory in 1940. He was preparing for publication his Catalogue of Stars at the time of his death.

Most of his work has appeared in *Publications of the Cincinnati Observatory,* Nos. 18, 19, and 20; of these he was joint author of 18 and 20 and independent author of 19. Later he published independently "The Luminosity of Meteors and Comets," a book of 48 pages.

He was intensely patriotic and volunteered in the Spanish-American War, but his regiment did not get to the front. He was a member of the Sons of the American Revolution, and was very proud of the career of his son, Stephan, a West Point graduate, who is now serving in the far East in the U. S. Army Engineer Corps, with the rank of Lieutenant Colonel. His daughter, Harriet, married Dr. Paul Herget, who succeeds him as Director of the Cincinnati Observatory.

Dr. Smith was a member of both Phi Beta Kappa and Sigma Xi. His scientific connections were the American Astronomical Society, the Astronomical Society of the Pacific, and the American Association for the Advancement of Science. His local clubs were the Torch Club of Cincinnati and the Cincinnati Schoolmaster's Club. Hs religious affiiliation was with the Knox Presbyterian Church.

The Pronunciations, Derivations, and Meanings of a Selected List of Star Names

By GEORGE A. DAVIS JR.

About eight years ago I thought that the time was appropriate to begin the collection of material for a new work on the constellations, which would include the results of the most recent scholarship, as well as data contained in manuscripts and works heretofore neglected by both American and English writers. I have continued my studies to the present time as assiduously as the demands of my profession have permitted. The present paper contains extracts from my notes which relate specifically to the star names in this list. The most difficult problem was to determine what to include and what to omit. Although the list is strictly a limited one, I have, in several instances, shown the wealth of material which exists, and which has not as yet been utilized by any writers on the constellations. Futhermore, I have never seen any American book on astronomy which includes the Arabic and Persian names of the stars in their original forms. I trust that I may be pardoned, therefore, for attempting, in a rather modest way, to remedy that omission.

The Committee of the American Astronomical Society on Preferred Spellings and Pronunciations published its Report in the August, 1942, issue of POPULAR ASTRONOMY,[1] and this Report contained, among other things, the pronunciations of fifty important star names. After the publication of this Report, and in response to requests from many members of the A.A.S. and others for the publication of a more extended list of star names and pronunciations, in accordance with the same general plan, together with a discussion of the derivations and meanings of all the names, this paper has been prepared.[2] Dr. Samuel G. Barton, of the Flower Astronomical Observatory, and I, who were two members of that Committee, have coöperated on the additional names and pronunciations, nearly all of which are also published in *A Guide to the Constellations,* Third Edition, by Samuel G. Barton and Wm. H. Barton, Jr. Although Dr. Barton is in no way responsible for the derivations and meanings, he has, nevertheless, made many excellent suggestions and several computations, which are incorporated herein, and for which I am very grateful.

A careful study of the following pages will reveal the falsity of some ideas concerning the astronomy of the Arabs which have been accepted for several hundred years. This is neither the time nor place to discuss them in detail, but I think that it is quite in order to call attention to them, especially in view of the fact that most of our star names are derived from the Arabic.

It has been said, time and again, that the Arabs used one star only to represent one living creature, but, on occasion, used more than one star to represent some inanimate object. This rule, we have been told, was the result of one of Muhammad's traditional prohibitions against depicting the human form, or any other living creature, either in paintings, in architecture, or in any other way. It must be remembered, however, that Arabian astronomy existed for several thousand years before the birth of Muhammad, and evidence still exists of the Sumerian influence on early Arabian star names, and, in particular, on the Arabian system of Lunar Mansions, a phase, and probably the first phase, of Sumerian astronomy which was either never transmitted to the Greeks or was never accepted by them.[3] I have given several instances of this influence. Then, too, the nomadic Arab paid little attention to any of the *ahadith* of the Prophet; in fact, the prohibition against painting or otherwise drawing "likenesses of God's creation," as well as the prohibition against the use of alcoholic drinks, "did no more prohibit then than did the 18th Amendment to the Constitution of the United States."[4] We find, therefore, many representations of living creatures in indigenous Arabian astronomy, both before and after Muhammad. A few examples will be found in the following pages, and many more could be given.

Another misconception is that when the Arabs became acquainted with Greek astronomy, they altered some of the constellation figures to suit their own ideas. Nothing could be farther from the truth, for the Arabs made no changes whatever in the Greek constellations. The fault has lain with the commentators who were unable to distinguish between the astronomy of the Arabs and the astronomy of the Greeks. A glance at the discussion of the stars in Perseus will make this perfectly clear. Many writers on the constellations, up to the present time, have thought that the Arabs conceived the figure of Perseus as something quite different from the Greek representation. It is obvious now that the early names of the stars in Perseus did not refer to Perseus at all.

Another misunderstanding has always existed concerning "the fish" among the stars in Andromeda and Pisces, that is, the Arabian fish has always been considered the equivalent of the northern fish of the zodiacal constellation, but, because of ignorance of the Greek figure, or for some other reason, the Arabs became confused and extended the fish into Andromeda. It is now clear that it was not the Arabs who were confused, but the non-Arabian commentators who tried to equate the two figures. Another large fish, incidentally, was represented by the Arabs among the stars in Andromeda's feet and in the northwestern part of Perseus.

I have also, here and there, corrected some erroneous translations which I have seen in well-known books on the constellations, which were obviously the result of ignorance of the Arabic language.

If my derivations are compared with those which have already been published, it will be discovered that I have fortunately been able to present for the first time the true origin of ten or eleven star names. I might say, in this connection, that the entire paper is the result of original research, and every statement that I have made is based on documents which would be received as legal evidence in any court of competent jurisdiction. If such evidence was not available, I have frankly said so. Some of my conclusions, appearing here for the first time, may seem somewhat surprising, but the evidence for their correctness is overwhelming; and such conclusions speak loudly of the utter futility of guesswork in researches of this kind.

I have one regret in publishing this paper at the present time, and that is that I have not been able to determine definitely the origin of *Albireo*. I am satisfied in my own mind that I know the answer, but I have not been able, under present conditions, to secure the necessary documentary proof.

I have added to the discussion of each star, as a convenient reference, its magnitude and spectrum. The magnitudes are visual and are taken from the *Henry Draper Catalogue*[5] except for the variable stars which have been discovered since its publication, and for Proxima. The combined magnitude is given for the double stars, and the spectrum is that of the brighter component. The spectra are principally from Harvard, Mt. Wilson, Victoria, and Yerkes, and are the latest which have been published. BS refers to the Yale University Observatory's *Catalogue of Bright Stars,* Second Edition (1940). The stars marked with an asterisk are those contained in the Report of the Committee. I have added in some cases, in parentheses, the Semitic equivalent of the Sumerian name. The underlined letters and words, except the names of the constellations, would, of course, be italicized if the paper were being printed in the usual way and the font contained the necessary type.

I express my deep gratitude to Professor Solomon L. Skoss of Philadelphia for his friendly advice and encouragement, and for looking over and checking a part of the manuscript. I am also indebted to him for informing me of the system of transliteration adopted by the *Journal of the American Oriental Society,* which I have followed throughout the paper. If, however, any errors are discovered, the responsibility therefor is entirely my own.

I also wish to thank Miss Mildred Ross of the Grosvenor Reference Library of Buffalo, Miss Ruth Sparrow of the Research Library of the Buffalo Museum of Science, Miss Dorrit Hoffleit of the Harvard College Observatory, and the libraries of Cornell, Harvard, and Princeton Universities for the many courtesies which they have extended to me during the past six or seven years.

Lastly, I wish to say that the publication of this paper at the present

ANDROMEDA (And)

α *ALPHERATZ (ăl-fē′răts), from the Arabic سرّة الفرس, Surrat al-Faras, "the horse's navel," formerly common to And and Peg. $2^m.15$ Aon

β *MIRACH (mī′răk), from the Arabic المراق, al-Marāqq, "the loins," a form very similar to that for β UMa. This, and other names, obviously derived from المئزر, al-Mi'zar, were simply taken from Ptolemy's description of the place of the star in the figure, and were never assigned to β by the Arabs. β was known chiefly as بطن الحوت, Baṭn al-Ḥūt, "the fish's belly," one of the names of the 28th and last Arabian Lunar Mansion. This fish, however, was not the northern fish of the zodiacal constellation Psc, which the Arabs called "the little fish," but a considerably larger one which they called al-Ḥūt, "the fish," and which comprised the following galaxy and stars: M 31, ν, μ, and β And, BS 374, 91, ν, φ, χ, and ψ′ Psc, and η, ζ, ε, δ, π, BS 157, and 32 And. $2^m.37$ Moe

γ *ALMACH (ăl′măk), from the Arabic عناق الارض, ʿAnāq al-Arḍ, literally "the earth-kid," the animal called in Persia سیاه گوش, Siyāh gosh, "the black ear," and in Arabia البريد, al-Barīd, "the badger, messenger, jackal, courier," etc., which attends upon the lion and guides him to his prey. $2^m.20$ K3

AQUARIUS (Aqr)

α SADALMELIK (sȧd′ăl-mĕl′ĭk), from the Arabic سعد الملك, Saʿd al-Malik, "the lucky star (or asterism) of the king," i.e., of ^{d}NÊRGAL, the Sumerian Sun-god of summer's heat and winter's cold, known in West Semitic religion as Melqart, Moloch, Malik, etc. The Sumerian name of Aquarius was ^{mul}GU-LA, "the great constellation," which was equivalent to ^{dingir}GU-LA, "the great god," as the stars represented the Sky-god AN (^{ilu}A-nu) pouring the waters of eternal life, which he kept in the highest heaven, upon the earth, and which was referred to in Sumerian art by the spouting or overflowing vase. The Arabic title refers to α and σ Aqr. $3^m.19$ cG1

β SADALSUUD (sȧd′ăl-sū′ŭd), from the Arabic سعد السعود, Saʿd as-Suʿūd, "the luckiest of the lucky stars (or asterisms)," the name of the 24th Arabian L.M., consisting of β and ξ Aqr, with 46 Cap sometimes being added. This title is an echo of the original Sumerian name of the star, ^{mul}NAM-MAḪ, "the star of powerful destiny." $3^m.07$ cG1

γ SADACHBIA (sȧd-ăk′bĭ-ȧ), from the Arabic سعد الاخبية, Sa'd al-Akhbiya, "the lucky star (or asterism) of the tents," the name of the 25th L.M., which consisted of γ, ζ, η, and π Aqr. 3^{m}.97 Al

δ SKAT (skăt), from the Arabic الساق, as-Sāq, "the leg," that is, from the ankle to the knee. 3^{m}.51 Aln

ε ALBALI (ăl-bā′lē), from the Arabic سعد البلع, Sa'd al-Bula', "the lucky star (or asterism) of the swallower," the name of the 23rd L.M., which consisted of ε, μ, and ν Aqr. 3^{m}.83 Aln

θ ANCHA (ăng′kȧ), a mediaeval Latin medical term, also written anca and ancis, "the upper part of the femur," or, more commonly, "the hip." 4^{m}.32 G6

AQUILA (Aql)

α *ALTAIR (ăl-tār′), from the Arabic النسر الطائر, an-Nasr at-Ṭā'ir, "the flying eagle or vulture," originally derived, of course, from the Sumerian ^{mul} IDᵇᵘ (^{kakkab} Našruᵇᵘ), "the constellation of the eagle," which was equated with ^{d} ZA-MÁ-MÁ, the great Sun-god of Kish, the most ancient capital of Sumer. Aql and Lyr were called by the Arabs an-Nasrain, النسرين, "the two eagles or vultures." 0^{m}.89 Aln

β ALSHAIN (ăl-shān′), from the substantive part of one of the Persian names of the constellation, شاهين تارازد, Shāhīni Tārāzad, "the plundering or ravishing falcon." 3^{m}.90 G8

γ TARAZED (tăr′ȧ-zĕd), from the adjectival part of the Persian name. Aql and Lyr were called by the Persians دوشاهين, Du Shāhīn, "the two falcons." 2^{m}.80 K4e

ARIES (Ari)

α *HAMAL (hăm′ăl), from the Arabic الحمل, al-Ḥamal, "the full-grown lamb," a modified form of the Sumerian ^{mul} LU-LIM (^{kakkab} Lulimu), "the constellation of the ram." 2^{m}.23 K1

β SHERATAN (shĕr′ȧ-tăn), from the Arabic الشرطان, ash-Sharaṭāni, "the two signs," presumably of the New Year, when Ari marked the vernal equinox, but this is not necessarily the original meaning of the title. This, according to existing records, was the name of the first Arabian L.M., which generally consisted of β and γ Ari. Sometimes α and β were regarded as constituting the L.M., and when γ was added, the three were called الاشراط, al-Ashrāṭ, "the signs." 2^{m}.72 A3

γ MESARTIM (mĕz′är-tĭm), from the Arabic المثرطم, al-Mutharṭim, "the extremely fat ram," the letter ث being generally transliterated s in the older dictionaries. 4^{m}.04 Aop

AURIGA (Aur)

α *CAPELLA (kȧ-pĕl′ȧ), from the Latin, "the little she-goat," the diminutive of capra, derived ultimately from one of the Sumerian names of the star, ^{mul} ÁŠ-KAR, "the goat star," and whence the most ancient Arabic name of the star, العيّوق, al-ʿAyyūq, "the goat," and the Greek name Αἴξ. 0^{m}.21 G1

β MENKALINAN (mĕn-kăl′ĭ-năn), from the Arabic منكب ذو العنان, Mankib dhū al-ʿInān, "the shoulder of the rein-holder." var Alnp

BOÖTES (Boo)

α *ARCTURUS (ärk-tū′rŭs), from the Greek of Hesiod, Ἀρκτοῦρος, "the bear-guard." This star, or possibly the constellation itself, was the northern ^{mul} SIB-ZI-AN-NA of the Sumerians, "the faithful shepherd of heaven," and, similarly, the Arabians' حارس السماء, Ḥāris as-Samāʾ, "the keeper of heaven," and حارس الشمال, Ḥāris ash-Shamāl, "the keeper of the north." α was also called السماك الرامح, as-Simāk ar-Rāmiḥ, "the armed or lance-bearing prop," one of the supports of heaven. The other prop was Spica. Compare with the functions of Shu, Atlas, Mithra, Veralden Tschuold, etc. 0^{m}.24 Koe

β NEKKAR (nĕk′kär), from an erroneously pointed form of the Arabic البقّار, al-Baqqār, "the drover or dealer in cattle." 3^{m}.63 G5

γ SEGINUS (sĕ-jī′nŭs), of uncertain derivation, but there is evidence tending to show that it is an astronomical erratic and a corrupt form of one of the Arabic names of Cep. 3^{m}.00 A5n

ε IZAR (ī′zär), from the Arabic الازار, al-Izār, "the loin-cloth." Other more interesting titles were: منطقة العوّاء, Minṭaqat al-ʿAwwāʾ, "the shouter's belt," تابع السماك, Tābiʿ as-Simāk, "the follower of the prop," راية السماك, Rāyat as-Simāk, "the flag or standard of the prop," and راية الفكّة, Rāyat al-Fakka, "the flag or standard of the broken one." 2^{m}.59 Ko

η′MUPHRID (mŭf′rĭd), from the Arabic مفرد الرامح, Mufrid ar-Rāmiḥ, "the solitary (star) of the spear-holder or lancer." 2^{m}.80 F7

μ ALKALUROPS (ăl′kȧ-lū′rōps), from the Greek Κἄλαῦροψ, "the shepherd's crook," with the Arabic article al prefixed. 4.47 A7n

CANCER (Cnc)

α ACUBENS (ăk′ū-bĕnz), from the Arabic الزبان, az-Zubān, "the claw," the full title being زبان السرطان الجنوبى, Zubān as-Saraṭān al-Janūbī, "the southern claw of the crab." 4.27 Fo

γ ASELLUS BOREALIS (ȧ-sĕl′ŭs bō′rē-ā′lĭs), from the Latin, "the northern little ass," the diminutive of asinus. 4.73 Ao

δ ASELLUS AUSTRALIS (ȧ-sĕl′ŭs ôs-trā′lĭs), "the southern little ass." 4.17 Ko

CANES VENATICI (CVn)

α COR CAROLI (kôr kăr′ō-lī), from the Latin, "Charles's heart." 2.80 Als

β CHARA (kā′rȧ), from the Greek Χαρά, "joy." 4.32 Go

CANIS MAJOR (CMa)

α *SIRIUS (sĭr′ĭ ŭs), from the Greek of Hesiod Σείριος, "the scorching one." -1.58 A2s

β MIRZAM (mĭr′zăm), from the Arabic المرزم, al-Mirzam, "the roarer," or, metaphorically, "the announcer or proclaimer." β CMa and β CMi were known as المرزمان, al-Mirzamāni, "the two proclaimers," i.e., of the rising of Sirius and Procyon. 1.99 cB1

ϵ ADHARA (ȧ-dā′rȧ), from the Arabic العذارى, al-ʿAdhārā, "the virgins," referring to δ, ϵ, η, and o^2 CMa. 1.63 cB1

ζ FURUD (fū′rōōd), from an erroneously pointed form of the Arabic القرود, al-Qurūd, "the male apes," referring to ζ and λ CMa and γ, δ, θ, κ, λ, μ, and ξ Col. 3.10 B5s

η ALUDRA (ăl-ŭd′rȧ), from the Arabic العذرة, al-ʿUdhra, in the title عذرة الجوزاء, ʿUdhrat al-Jauzā', "the virginity or maidenhood of Orion." The names of ϵ and η are derived from the myth in which Suhail married the virgin Orion, and the four stars which were mentioned above under ϵ were probably regarded as her attendants. ʿUdhra is not the singular of ʿAdhārā. 2.43 cB7

CANIS MINOR (CMi)

α *PROCYON (prō′sĭ-ŏn), from the Greek Προκύων, "before the dog,"

i.e., the bright star which rises before Sirius. 0.m48 F3s

β GOMEISA (gŏ-mī′zā), from the Arabic الغميصاء, al-Ghumaiṣā', "the weeping or blear-eyed one," properly one of the names of Procyon, and refers to the ancient Arabic myth concerning Sirius and Procyon, who were اختا سهيل, Ukhtā Suhail, "the two sisters of Canopus." 3.m09 B8ne

CAPRICORNUS (Cap)

α ALGEDI (ăl-jē′dē), from the Arabic الجدى, al-Jadī, "the kid." 3.m77 G8

β DABIH (dā′bē), from the Arabic سعد الذابح, Sa'd adh-Dhābiḥ, "the lucky star (or asterism) of the sacrificer or slaughterer," the name of the 22nd Arabian L.M., consisting of α and β Cap, and shows the influence of the Sumerian name of the star, mul SAK-SA-DI, "the star of the bright horn of slaughter." 3.m25 F8

γ NASHIRA (nā′shĭ-rà), from the Arabic سعد الناشرة, Sa'd an-Nāshira, "the lucky star (or asterism) of the verdant fields at the end of summer," referring to γ and δ Cap. 3.m20 F4

δ DENEB ALGEDI (dĕn′ĕb ăl-jē′dē), from the Arabic ذنب الجدى, Dhanab al-Jadī, "the kid's tail." 2.m98 A7s

CARINA (Car)

α *CANOPUS (kà-nō′pŭs), from the Greek Κάνωπος, a city of ancient Egypt, and, according to classical tradition, the name of the chief pilot of the fleet of Menelaus. -0.m86 Fo

β MIAPLACIDUS (mī′à-plăs′ĭ-dŭs), from the Arabic المياه, al-Miyāh, "the waters," and the Latin placidus, "quiet, still," i.e., the still waters in which the ship Argo is resting. 1.m80 Ao

ι ASPIDISKE (ăs′pĭ-dĭs′kē), from the Greek Ἀσπιδίσκε, "the little shield or boss," the diminutive of Ἀσπίς. 2.m25 Fo

CASSIOPEIA (Cas)

α *SCHEDAR (shĕd′ăr), from the Arabic الصدر, aṣ-Ṣadr, "the breast." var G7e

β CAPH (kăf), from the Arabic الكفّ الخضيب, al-Kaff al-Khaḍīb, "the stained hand," and refers to an ancient figure of the Arabs called كفّ الثريّا اليمين المبسوطة, Kaff ath-Thurayyā al-Yamīn al-Mabsūṭa, "the outstretched right hand of the Pleiades," which consisted of a

shoulder, arm, and hand, and extended from the Pleiades, through Per, to the stars in Cas, which represented a hand with the ends of the fingers stained in the oriental manner (anāmil makhḍūba). What remains of the left hand will be found in Cet. $2^m.42$ P2

δ RUCHBAH (rŭk′bȧ), from the Arabic ركبة الذات الكرسى, Rukbat adh-Dhāt al-Kursī, "the knee of the lady of the chair." var A3n

CENTAURUS (Cen)

α RIGIL KENTAURUS (rī′jĭl kĕn-tô′rŭs), from the Arabic رجل القنطورس, Rijl al-Qanṭūris, "the centaur's foot." $0^m.06$ G4

PROXIMA (prŏk′sĭ-mȧ), from the Latin, "the nearest" (star). $11^m.3$ m

CEPHEUS (Cep)

α ALDERAMIN (ăl-dĕr′ȧ-mĭn), from the Arabic الذراع اليمين, adh-Dhirā' al-Yamīn, "the right forearm." This will be the brightest star near the pole from about 6500 to 8300, the successor to Alfirk and the predecessor of BS 7955. $2^m.60$ A3n

β ALFIRK (ăl′fûrk), from the Arabic كواكب الفرق, Kawākib al-Firq, "the stars of the flock," referring chiefly to α, β, and η Cep. This will be the brightest star near the pole from about 5100 to 6500. var B1s

γ ERRAI (ĕr-rā′ē), from the Arabic الراعى, ar-Rā'ī, "the shepherd." This will be the brightest star near the pole from about 3100 to 5100, the successor to Polaris and the predecessor of Alfirk. $3^m.42$ K1e

ξ KURHAH (kûr′ȧ), from the Arabic القرحة, al-Qurḥa, "the blaze or small star on the forehead of a horse." $4^m.40$ A3

CETUS (Cet)

α *MENKAR (mĕn′kär), from the Arabic المنخر, al-Minkhar, "the nostril." The ancient Arabs called α, γ, δ, λ, μ, and ξ^2, the six stars in the head, الكفّ الجذماء, al-Kaff al-Jadhmā', "the amputated hand," i.e., of the Pleiades, only the stump of the wrist being left. This was so called because of the small size of the asterism as compared with the hand in Cas, and also because of the shorter series of stars connecting it with the Pleiades. $2^m.82$ M2

β *DENEB KAITOS (dĕn′ĕb kā′tŏs), from the Arabic ذنب القيطس الجنوبى, Dhanab al-Qiṭas al-Janūbī, (the star in) "the southern branch of the sea-

monster's tail." The more ancient name, however, was الضفدع الثانى, aḍ-Ḍifdaʿ ath-Thānī, "the second frog," Fomalhaut being the first. $2^m.24$ G6

ζ BATEN KAITOS (bāt′ĕn kā′tŏs), from the Arabic بطن القيطس, Baṭn al-Qīṭas, "the sea-monster's belly." The Arabs called ζ, η, θ, τ, and υ, النعامات, an-Naʿāmāt, "the ostriches." $3^m.92$ Ko

o *MIRA (mī′rȧ), from the Latin title of a work by Hevelius, Historiola Mirae Stellae, "A Short History of the Wonderful Star." var M6e

COLUMBA (Col)

α PHACT (făkt), from the Arabic الفاختة, al-Fākhta or al-Fākhita, "the ring-dove," a name originally applied by some Arabians to Cyg, but which later wandered to this star when Col became a constellation. $2^m.75$ B8ne

β WAZN (wāz″n), from the Arabic الوزن, al-Wazn, "the weight," one of the stars referred to in a well-known legend of the Arabs, which revolved around the rising of Canopus. $3^m.22$ Ko

CORONA BOREALIS (CrB)

α *ALPHECCA (ăl-fĕk′ȧ), from the Arabic الفكّة, al-Fakka, "the broken or fractured one" (the word does not mean "dish" or "bowl"), the earliest name of the constellation among the Arabs, and refers to the incomplete or broken circle of stars, which fact gave rise to the following names of the constellation: قصعة المساكين, Qaṣʿat al-Masākīn, "the bowl of the beggars," and قصعة الصعاليك, Qaṣʿat aṣ-Ṣaʿālīk, "the bowl of the poor or indigent." The Persians had similar names for the constellation. var Aln

β NUSAKAN (nū′sȧ-kăn), from the Arabic النسقان, an-Nasaqāni, "the two series or lines" (of stars), applied to this star through an erroneous description by Fīrūzābādī in his al-Qāmūs. The name refers to the northern and southern series of stars, النسق الشأمى, an-Nasaq ash-Shaʾmī, and النسق اليمانى, an-Nasaq al-Yamānī, which began near this star and ran through Her, Lyr, Ser, and Oph, and formed two sides of الروضة, ar-Rauḍa, "the garden or meadow." $3^m.72$ A7s

CORVUS (Crv)

α ALCHIBA (ăl-kē′bȧ), from the Arabic الخباع, al-Khibāʿ, "the tent," one of the early names of the constellation. $4^m.18$ F2

γ GIENAH (jē′nȧ), from the Arabic جناح الغراب الايمن, Janāḥ al-

Ghurāb al-Aiman, "the right wing of the raven." $2^m.78$ B8

δ ALGORAB (ăl-gō′răb), from the Arabic الغراب, al-Ghurāb, "the raven." The principal stars of Crv were also called عرش السماك الاعزل, ʿArsh as-Simāk al-Aʿzal, "the throne of the unarmed prop," i.e., Spica. $3^m.11$ Aon

CRATER (Crt)

α ALKES (ăl′kēz), from the Arabic الكأس, al-Kaʾs, "the cup," especially one filled with wine. $4^m.20$ K1

CRUX (Cru)

α ACRUX (ā′krŭks), a modern name coined from α Crucis, the designation of the star in the Bayer system. $1^m.05$ B1n

CYGNUS (Cyg)

α *DENEB (dĕn′ĕb), from the Arabic ذنب الدجاجة, Dhanab ad-Dajāja, "the hen's tail." $1^m.33$ cA2e

β *ALBIREO (ăl-bĭr′ē-ō), of unknown derivation. Ideler's suggestion is not accepted. $3^m.10$ Ko

γ SADR (săd″r), from the Arabic صدر الدجاجة, Ṣadr ad-Dajāja, "the hen's breast." $2^m.32$ cF7

DRACO (Dra)

α *THUBAN (thōō′băn), from the Arabic الثعبان, ath-Thuʿbān, "the serpent or dragon," which was the brightest star near the pole from about 3700 to 1500 B.C., the successor to Edasich and the predecessor of Kochab. $3^m.64$ Aop

β RASTABAN (ràs′tà-băn), from the Arabic رأس الثعبان, Raʾs ath-Thuʿbān, "the serpent's head." β, γ, ν, and ξ form the head of our Draco, and, collectively, were called by the ancient Arabs العوائذ, al-ʿAwāʾidh, "the aged camels." $2^m.99$ cG2e

γ ELTANIN (ĕl-tā′nĭn), from the Arabic رأس التنين, Raʾs at-Tinnīn, "the dragon's head." $2^m.42$ K5e

δ ALTAIS (ăl′tās), from the Arabic التيس, at-Tais, "the he-goat." $3^m.24$ G8

ι EDASICH (ĕd′ā-sĭk), from the Arabic الذيخ, adh-Dhīkh, "the hairy male hyena." $3^m.47$ K3

λ GIAUSAR (jô′zär), from the Persian جوزهر, Jauzahr, "the dragon's

head and tail," and called by the Arabs العقدتان, al-'Uqdatāni, "the two knots," referring to the nodes of the Moon's orbit which were regarded as "the poison places." 4.m06 Mo

μ ALRAKIS (ăl-rā'kĭs), from the Arabic الراقص, ar-Rāqiṣ, "the dancer or leaper," which wandered here from Her. The original desert name, differently pointed, was الرافض, ar-Rāfiḍ, "the freely pasturing camel," thus completing the group of camels in the head of Dra. 5.m06 F6

ξ GRUMIUM (groo'mĭ-ŭm), a faulty transcription of the Greek γενειον, "the under jaw" (of the dragon). β, γ, and ξ Dra, with ι Her, constituted the Arabian asterism الصليب الواقع, aṣ-Ṣalīb al-Wāqiʿ, "the falling cross." 3.m90 K3

EQUULEUS (Equ)

α KITALPHA (kĭ-tăl'fa), from the Arabic قطعة الفرس, Qiṭʿat al-Faras, "the part or section of the horse." 4.m14 F6

ERIDANUS (Eri)

α *ACHERNAR (ā'kēr-när), from the Arabic آخر النهر, Ākhir an-Nahr, "the end of the river," originally applied to θ Eri. 0.m60 B9n

β CURSA (kûr'sa), from the Arabic كرسي الجوزاء المقدّم, Kursī al-Jauzā' al-Muqaddam, "the foremost chair of Orion," consisting of β, λ, and ψ Eri and τ Ori. 2.m92 A2n

γ ZAURAK (zô'răk), from the Arabic نائر الزورق, Nā'ir az-Zaurag, "the bright (star) of the boat," this name having wandered here from α Phoenicis, α, β, γ, κ, μ, and ν Phe having been called az-Zaurag, "the boat," a rather striking asterism. 3.m19 Mo

η AZHA (ăz'a), from the Arabic ادحي النعام, Udhī an-Naʿām, "the hatching place of the ostrich," but, because of an error by a copyist, I find that the letter ى in the St. Petersburg and Copenhagen MSS. of aṣ-Ṣūfī was written ز in two places in the partial, and often erroneous, copy which was used by Hyde and Ideler. ازحي is neither Arabic nor Persian. The title refers to the curving line of stars in the western part of Eri, running from ζ to τ5 Eri, and which included ε and π Cet. 4.m05 K2

θ ACAMAR (ā'kă-mär), another form of Achernar. 3.m06 A2

o' BEID (bīd), from the Arabic البيض, al-Baiḍ, "the eggs," originally designating the stars about the hatching place. 4.m14 F1

o² KEID (kīd), from the Arabic القيض, al-Qaiḍ, "the fragment of an

egg-shell," also referring to each star in this vicinity. $4^m.48$ Ko

GEMINI (Gem)

α *CASTOR (kȧs′tẽr), the Latin form of the Greek Καστωρ, one of the twin sons of Zeus, who were called the Dioscuri. $1^m.58$ A2

β *POLLUX (pŏl′ŭks), the Latin form of the Greek Πολυδεύκης, the other twin son of Zeus. The well-known Sumerian name of Gemini was mul MAŠ-TAB-BA-GAL-GAL, "the constellation of the great twins." $1^m.21$ G8

γ ALHENA (ăl-hĕn′ȧ), from the Arabic الهنعة, al-Han'a, "the brand-mark," the name of the 6th Arabian L.M., which consisted generally of γ and ξ Gem; sometimes, however, η, μ, and ν were added. These five stars, together with ε, 13, and 15 Mon were regarded as قوس الجوزاء, Qaus al-Jauzā', "Orion's bow," and this is one of the reasons for the confusion which exists among writers who apply the word Jauzā' to the stars in Gem. $1^m.93$ A3

δ WASAT (wā′sȧt), from the Arabic وسط السماء, Wasaṭ as-Samā', "the middle of the sky," i.e., the ecliptic, δ being only about 11' 7" south of it (1940.0). $3^m.51$ A8

ε MEBSUTA (mĕb-sū′tȧ), from the Arabic ذراع الاسد المبسوطة, Dhirā' al-Asad al-Mabsūṭa, "the outstretched paw of the lion," i.e., the lion of the Arabs. They designated this paw, however, by α and β Gem which constituted the 7th L.M., and which they called simply adh-Dhirā'. $3^m.18$ cG8

ζ MEKBUDA (mĕk-bū′dȧ), from the Arabic ذراع الاسد المقبوضة, Dhirā' al-Asad al-Maqbūḍa, "the folded paw of the lion," the Arabs designating this paw by α and β CMi. var cGl

η PROPUS (prō′pŭs), from the Greek πρόπους in Ptolemy's description of the star, "the projecting foot" (of the foremost twin). var M3

HERCULES (Her)

α *RASALGETHI (ras′ăl-jē′thē), from the Arabic رأس الجاثى, Ra's al-Jāthī, "the kneeler's head," from the name of the constellation, جاثى على ركبتيه, Jāthī 'alā Rukbataihi, "the kneeler on both his knees." var M5'

β KORNEPHOROS (kôr-nĕf′ō-rŏs), from the Greek Κορυνηφόρος, "the club-bearer." This was one of the stars in an-Nasaq ash-Sha'mī.

2m.81 G5

HYDRA (Hya)

α *ALPHARD (ăl'fărd), from the Arabic فرد الشجاع, Fard ash-Shujā', "the solitary (star) of the serpent." 2m.16 K5

LEO (Leo)

α *REGULUS (rĕg'ū-lŭs), from the Latin, "the prince," the diminutive of rex. The Sumerian name of the star was mul LUGAL (kakkab Šarru), "the star of the king," whence the Arabian المالكى, al-Mālikī, "the royal (star)." 1m.34 B9n

β *DENEBOLA (dĕ-nĕb'ō-la), from the Arabic ذنب الاسد, Dhanab al-Asad, "the lion's tail." 2m.23 A4n

γ ALGIEBA (ăl-jē'ba), from the Arabic الجبهة, al-Jabha, "the forehead" (of the Arabian lion), sometimes written جبهة الاسد, Jabhat al-Asad, the name of the 10th Arabian L.M., which consisted of α, γ, ζ, and η Leo. 2m.30 K1

δ ZOSMA (zōz'ma), from the Greek ζῶσμα, "the loin-cloth." 2m.58 A2n

ζ ADHAFERA (a-dā'fĕ-ra), from the Arabic الضفيرة, aḍ-Ḍafīra, "the plaited or twisted hair," originally designating the stars included within the triangle formed by γ, 4, and 21 Com. 3m.65 Fo

θ CHERTAN (chĕr'tăn), from the Arabic الخرتان, al-Kharātānī, "the two small ribs," an alternate title of زبرة الاسد, Zubrat al-Asad, "the lion's mane or shoulder," the name of the 11th L.M., which consisted of δ and θ Leo. 3m.41 A4s

λ ALTERF (ăl'tĕrf), from the Arabic الطرف, aṭ-Ṭarf, "the eye or glance" (of the Arabian lion), the name of the 9th L.M., consisting of κ Cnc (sometimes incorrectly given as ξ Cnc) and λ Leo. 4m.48 K5

μ RASALAS (ràs'a-lăs), from the Arabic رأس الاسد الشمالى, Ra's al-Asad ash-Shamālī, (the star in) "the northern part of the lion's head." 4m.10 K3

LEPUS (Lep)

α ARNEB (är'nĕb), from the Arabic الارنب, al-Arnab, "the hare." 2m.69 cF3

β NIHAL (nī'ăl), from the Arabic النهال, an-Nihāl, "the camels quenching their thirst," referring to α, β, γ, and δ Lep. These stars were also called كرسى الجوزاء المؤخر, Kursī al-Jauzā' al-Mu'akh-

khar, "the hindmost chair of Orion," to distinguish it from the one in Eri. $2^m.96$ Gl

LIBRA (Lib)

α ZUBENELGENUBI (zo͞o-bĕn′ĕl-jĕ-nū′bē), from the Arabic الزبان الجنوبى, az-Zubān al-Janūbī, "the southern claw" (of the scorpion). $2^m.90$ Fl

β ZUBENESCHAMALI (zo͞o-bĕn′ĕs-shā-mā′lē), from the Arabic الزبان الشمالى, az-Zubān ash-Shamālī, "the northern claw." α and β Lib constituted the 16th Arabian L.M., which was called الزبانيان, az-Zubāniyāni, "the two claws." This title alone shows the great antiquity of the Arabian Lunar Mansions. $2^m.74$ B8

LYRA (Lyr)

α *VEGA (vē′gä), from the Arabic النسر الواقع, an-Nasr al-Wāqi', "the falling eagle or vulture." $0^m.14$ Al

β SHELIAK (shĕl′yăk), from the Persian شلياق, Shalyāq, "the tortoise," derived from the Greek Χέλυς, the little tortoise from which Hermes constructed the first stringed musical instrument, and which was the earliest Greek name of the constellation. var cB9 + B5ep

γ SULAFAT (sū′lä-făt), from the Arabic السلحفاة, as-Sulaḥfāt, "the tortoise." β and γ were the two easternmost stars in an-Nasaq ash-Sha'mī. $3^m.30$ B9

OPHIUCHUS (Oph)

α *RASALHAGUE (räs′ăl-hā′gwē), from the Arabic رأس الحوّاء, Ra's al-Ḥawwā', "the head of the serpent collector," sometimes translated "serpent charmer." $2^m.14$ Ac

β CEBALRAI (sĕb′ăl-rā′ē), from the Arabic كلب الراعى, Kalb ar-Rā'ī, "the shepherd's dog." $2^m.94$ Kl

δ YED PRIOR (yĕd prī′ĕr), from the Arabic اليد, al-Yad, and the Latin, "the foremost (star) in the hand." δ, ε, η, and ζ Oph were stars in an-Nasaq al-Yamānī. $3^m.03$ Mc

ε YED POSTERIOR (yĕd pŏs-tēr′ĭ-ĕr), "the hindmost (star) in the hand." $3^m.34$ G7

η SABIK (sā′bĭk), from the Arabic السابق الثانى, as-Sābiq ath-Thānī, "the second winner or conqueror," located in the right knee of Oph, ζ being السابق الاوّل, as-Sābiq al-Awwal, "the first winner or conqueror," situated in the left knee. These names refer to the "tra

ling" of the "huge monster," Scorpius, with "both his feet." To translate sābiq here in the sense of "preceding," as all previous commentators have done, is to deprive the star name of any meaning. $2^{m}.63$ A2s

λ MARFIK (mär′fĭk), from the Arabic المرفق, al-Marfiq or al-Mirfaq, "the elbow." $3^{m}.85$ Aln

ORION (Ori)

α *BETELGEUSE (bĕt′ē̆l-jūz). The evidence is inconclusive as to the first syllable since several derivations are possible, but the name is probably from the Arabic ابط الجوزاء, Ibṭ al-Jauzā', literally, "the armpit of the white-belted sheep," a comparatively late title, for it combines the location of the star in the classical figure with the earliest Arabic name of the constellation. This ancient figure, however, may have consisted originally of the belt stars and γ, κ, and λ, for the earliest name of both α and β was راعي الجوزاء, Rā'ī al-Jauzā', "the shepherd of the white-belted sheep." Later al-Jauzā' lost its original significance and became synonymous with the Greek Orion. This constellation was the southern ^{mul} SIB-ZI-AN-NA of the Sumerians, which was equated with ^{d} DUMU-ZI, the well-known Tammuz of the West Semitic cults, "the faithful son," referring to "the greatest of all ancient myths." var M2

β *RIGEL (rī′jē̆l), from the Arabic رجل الجوزاء اليسرى, Rijl al-Jauzā' al-Yusrā, "Orion's left foot," formerly common to Ori and Eri. $0^{m}.34$ cB8e

γ *BELLATRIX (bĕ-lā′trĭks), from the Latin, "the female warrior." $1^{m}.70$ B2s

δ MINTAKA (mĭn′tȧ-kȧ), from the Arabic منطقة الجوزاء, Mintaqat al-Jauzā', "Orion's belt or girdle." var Bln

ε ALNILAM (ăl-nī′lăm), from the Arabic النظام, an-Niẓām, "the string of pearls," a title which referred to the three belt stars collectively. $1^{m}.75$ Bo

ζ ALNITAK (ăl-nī′tăk), from the Arabic النطاق, an-Niṭāq, "the belt." $1^{m}.91$ Bone

κ SAIPH (sāf), from the Arabic سيف الجبّار, Saif al-Jabbār, "the sword of the powerful one," originally designated by θ, ι, and 42 Ori. $2^{m}.20$ cBo

λ MEISSA (mī′sȧ), from the Arabic الميسان, al-Maisān, "the glitter-

ing or sparkling star," originally applied by the Arabs to γ Gem in the 6th L.M. λ, ϕ', and ϕ^2 Ori formed the 5th Arabian L.M., which was called الهقعة, al-Haq'a, "the circle of hairs," and some early commentators confused the two because of the similarity of names and because the name Jauzā' was frequently used to designate the stars in Gem. The brightest stars in Orion, however, were very appropriately called, in the plural, المياسين, al-Mayāsīn. $3^m.49$ O8s

PEGASUS (Peg)

α *MARKAB (mär'kăb), from the Arabic مركب, Markab, "riding, or anything on which one is carried," e.g., a horse, chariot, camel, litter, or ship. $2^m.57$ Ao

β *SCHEAT (shē'ăt), a corrupt transliteration of the Arabic الساق, as-Sa'q, "the leg," frequently used in the catalogues. $2^m.61$ M2

γ *ALGENIB (ăl-jē'nĭb), from the Arabic الجانب, al-Jānib, "the side." $2^m.87$ B2s

ϵ ENIF (ĕn'ĭf), from the Arabic انف الفرس, Anf al-Faras, "the horse's nose." $2^m.54$ cKo

ζ HOMAM (hō'măm), from the Arabic سعد الهمام, Sa'd al-Humām, "the lucky star (or asterism) of the great king or hero," referring to ζ and ξ Peg. $3^m.61$ B8

η MATAR (mā'tär), from the Arabic سعد المطر, Sa'd al-Matar, "the lucky star (or asterism) of the rain," referring to η and o Peg. $3^m.10$ G2

θ BIHAM (bī'ăm), from the Arabic سعد النهام, Sa'd al-Bihām, "the lucky star (or asterism) of the flock of lambs, kids, and camels' colts," referring to θ and ν Peg. These stars were sometimes called سعد النهائم, Sa'd al-Bahā'im, "the lucky star (or asterism) of the wild beasts." $3^m.70$ A2

μ SADALBARI (sad'ăl-bā'rē), from the Arabic سعد البارع, Sa'd al-Bāri', "the lucky star (or asterism) of the one excelling in knowledge and virtue," referring to λ and μ Peg. Differently pointed, this asterism was also called سعد النازع, Sa'd an-Nāzi', "the lucky star (or asterism) of the camel longing for its usual pasture." $3^m.67$ G6

PERSEUS (Per)

α *MIRFAK (mĭr'făk), from the Arabic مرفق الثريا, Mirfaq ath-Thuray-

rā, "the elbow of the Pleiades ('the moderately rich' cluster)," referring to the ancient figure of "the outstretched right hand of the Pleiades," mentioned above under Cas. A late Arabian title for the star was جنب برشاوش, Jamb Barshāush, "the side of Perseus," from which we derive Algenib, the other well-known name of α. 1.m90 cF4

β *ALGOL (ăl'gŏl), from the Arabic رأس الغول, Ra's al-Ghūl, "the demon's head." var B9

ζ ATIK (ā'tĭk), from the Arabic عاتق الثريّا, ʿĀtiq ath-Thurayyā, "the shoulder blade of the Pleiades," referring to both ζ and o Per. 2.m91 cB1

ξ MENKIB (mĕn'kĭb), from the Arabic منكب الثريّا, Mankib ath-Thurayyā, "the shoulder of the Pleiades." To complete this ancient Arabic figure: h and χ were المعصم, al-Miʿṣam, "the wrist," η and γ were الساعد, as-Sāʿid, "the forearm," σ was المأبض, al-Maʾbiḍ, "the bend of the arm," ψ was ابرة المرفق, Ibrat al-Mirfaq, "the tip of the elbow," and δ, ν, and ε were العضد, al-ʿAḍid, "the upper arm," - all of ath-Thurayyā. 4.m05 07ne

PISCES (Psc)

α ALRESCHA (ăl-rē'shȧ), from the Arabic الرشاء, ar-Rashāʾ, "the rope or cord," originally one of the names of β And as a member of the 28th Arabian L.M., and referred to the rope attached to the bucket formed by α, β, and γ Peg and α And, which was called الدلو, ad-Dalw, and did not refer in any way to the cord or thread binding the two fishes in Psc. 3.m94 A2n

PISCIS AUSTRINUS (PsA)

α *FOMALHAUT (fō'măl-ôt), from the Arabic فم الحوت الجنوبي, Fum al-Ḥūt al-Janūbī, "the mouth of the southern fish." The indigenous names, however, were الضفدع الاوّل, aḍ-Ḍifdaʿ al-Awwal, "the first frog," and الظليم, aẓ-Ẓalīm, "the male ostrich." 1.m29 A2s

SAGITTARIUS (Sgr)

α RUKBAT (rŭk'băt), from the Arabic ركبة الرامي, Rukbat ar-Rāmī, "the archer's knee." 4.m11 B9n

β ARKAB (är'kăb), from the Arabic عرقوب الرامي, ʿUrqūb ar-Rāmī, "the archer's tendon Achilles." 4.m24 B8

γ ALNASL (ăl-năz''l), from the Arabic النصل, an-Nasl, "the point of the arrow." γ, δ, ε, and η Sgr constituted an Arabian asterism called

النعائم الواردة, an-Na'ā'im al-Wārida, "the approaching ostriches." One ancient tradition, however, saw in these stars only one ostrich, and one ostrich in the stars mentioned below under ζ. 3.m07 Ko

δ KAUS MEDIA (kôs mē'dĭ-ȧ), from the Arabic القوس, al-Qaus, and the Latin, "the middle part of the bow." 2.m84 K2

ε KAUS AUSTRALIS (kôs ôs-trā'lĭs), "the southern part of the bow." 1.m95 Ao

ζ ASCELLA (ȧ-sĕl'ȧ), a mediaeval Latin term, frequently written axilla in the catalogues, "the armpit." ζ, φ, σ, and τ Sgr formed another Arabian asterism called النعائم الصادرة, an-Na'ā'im as-Sādira, "the departing ostriches." 2.m71 A4n

λ KAUS BOREALIS (kôs bō'rė-ā'lĭs), "the northern part of the bow." 2.m94 K1

σ NUNKI (nŭn'kē), from the name of the 30th Sumerian L.M., mul GU-SIR-A-AB-BA : mul NUN^{ki}, "the asterism of the yoke of the sea : the asterism of the holy city," i.e., Eridu on the Persian Gulf, sacred to d EN-KI (ilu Ê-a), the god who dwelt in "the sweet waters." 2.m14 B3n

SCORPIUS (Sco)

α* ANTARES (ăn-tā'rēz), from the Greek Ἀντάρης, "the rival of Mars" (Ἄρης). 1.m22 M1

β GRAFFIAS (grăf'ĭ-ăs), from the Greek γραφαῖος, "the crab." 2.m76 Bon

λ SHAULA (shô'lȧ), from the Arabic الشولة, ash-Shaula, "the cocked-up part of the scorpion's tail." This is the name of the 19th Arabian L.M., which consisted of λ and υ Sco. 1.m71 B2n

υ LESATH (lĕs'ăth), from the Arabic اللسعة, al-Las'a, "the scorpion's sting." The names of λ and υ are echoes of one of the Sumerian names of the constellation and the name of the 27th L.M., mul GIR-TAB (kakkab Aqrabu), "the constellation (or asterism) of the scorpion." These two stars were individually called d ŠAR-ÙR and d SAR-GAZ, the names of two well-known Star-gods. 2.m80 B3

SERPENS (Ser)

α UNUKALHAI (ū'nŭk-ăl-hā'ē), from the Arabic عنق الحيّة, ʿUnuq al-Ḥayya, "the serpent's neck." This was one of the stars in an-Nasaq al-Yamānī. 2.m75 K2

θ ALYA (ăl′yȧ), probably an abridged transliteration of al-Ḥayya, "the serpent." 4^m.10 A5

TAURUS (Tau)

α *ALDEBARAN (ăl-dĕb′ȧ-răn), from the Arabic الدبران, ad-Dabarān, "the follower," i.e., of the Pleiades; this is also the name of the 4th Arabian L.M., which consisted of α, γ, δ, ϵ, θ^1, and θ^2 Tau, the brightest stars in the Hyades. 1^m.06 K5

β *ELNATH (ĕl′năth), from the Arabic الناطح, an-Nāṭiḥ, "the one butting with horns," formerly common to Tau and Aur; it was also one of the names of α Ari. 1^m.78 B8

η *ALCYONE (ăl-sī′ō̇-nē), from the Greek Ἀλκυόνη. 2^m.96 B5ne

16 CELAENO (sē̇-lē′nō), from the Greek Κελαινώ. 5^m.43 B7n

17 ELECTRA (ē̇-lĕk′trȧ), from the Greek Ἠλέκτρα. 3^m.81 B5ne

19 TAYGETA (tă-ĭj′ē̇-tȧ), from the Greek Ταϋγέτη. 4^m.37 B7n

20 MAIA (mā′yȧ), from the Greek Μαῖα. 4^m.02 B9s

21 STEROPE (stĕr′ō̇-pē), from the Greek Στερόπη. 5^m.85 B9n

23 MEROPE (mĕr′ō̇-pē), from the Greek Μερόπη. 4^m.25 B5ne

27 ATLAS (ăt′lăs), from the Greek Ἄτλας. 3^m.80 B9n

28 PLEIONE (plē′yŏ̄-nē), from the Greek Πληϊόνη. 5^m.18 B8ne

URSA MAJOR (UMa)

α *DUBHE (dŭb′ē), from the Arabic ظهر الدبّ الاكبر, Ẓahr ad-Dubb al-Akbar, "the back of the greater bear." It might be well to note here that there was no "bear" constellation in the astronomy of the Sumerians and Babylonians: they called UMa ^{mul} MAR-GÍD-DA, "the constellation of the long chariot." 1^m.95 G7

β *MERAK (mē′răk), from the Arabic مراق الدبّ الاكبر, Marāqq ad-Dubb al-Akbar, "the loins of the greater bear." 2^m.44 A2s

γ *PHECDA (fĕk′dȧ), from the Arabic فخذ الدبّ الاكبر, Fakhidh ad-Dubb al-Akbar, "the thigh of the greater bear." 2^m.54 Aon

δ *MEGREZ (mē′grĕz), from the Arabic مغرز الدنب الدبّ الاكبر, Maghriz adh-Dhanab ad-Dubb al-Akbar, "the root of the tail of the greater bear." 3^m.44 Aon

ϵ *ALIOTH (ăl′ĭ-ŏth), one of the ridiculously corrupt forms of al-ʿAyyūq, the ancient Arabic name of Capella. This is just another exam-

ple of how star names are wont to wander at the hands of the uninformed. Scaliger's derivation is not accepted. The Arabic names for this star were الجون, al-Jaun, "the black horse or camel," and الحور, al-Ḥawar, or الحوّر, al-Ḥawwar, "the extremely bright one," an appropriate name for the brightest star in the constellation. $1^m.68$ A2s

ζ *MIZAR (mī′zär), from the Arabic al-Mi'zar, "the veil, trousers, or waist-cloth," erroneously applied to this star. The Arabs called it العناق, al-'Anāq, "the female kid." This word is not the plural of عنق, 'Unq or 'Unuq, "neck." $2^m.17$ A2s

η *ALKAID (ăl-kād′), from the Arabic قائد البنات النعش, Qā'id al-Banāt an-Na'sh, "the leader or governor of the daughters of the bier," one of the early names of the constellation having been بنات النعش الكبرى, Banāt an-Na'sh al-Kubrā, "the daughters of the greater bier." $1^m.91$ B3n

ι TALITHA (tā′lĭth-ȧ), from the Arabic القفزة التالثة, al-Qafza ath-Thālitha, "the third leap" (of the gazelles), applied by the Arabs to both ι and κ UMa. $3^m.12$ A5n

λ TANIA BOREALIS (tān′yȧ bō′rē-ā′lĭs), from the Latin and the Arabic القفزة الثانية, al-Qafza ath-Thāniya, "the northern (star) of the second leap." $3^m.52$ A2s

μ TANIA AUSTRALIS (tān′yȧ ôs-trā′lĭs), "the southern (star) of the second leap." $3^m.21$ K5

ν ALULA BOREALIS (ăl-ū′lȧ bō′rē-ā′lĭs), from the Latin and the Arabic القفزة الاولى, al-Qafza al-Ūlā, "the northern (star) of the first leap." $3^m.71$ K3

ξ ALULA AUSTRALIS (ăl-ū′lȧ ôs-trā′lĭs), "the southern (star) of the first leap." These three pairs of stars, collectively, were known as قفزات الظباء, Qafzāt az-Ẓibā', "the leaps of the gazelles," referring to an ancient and familiar Arabic legend. $3^m.86$ Go

ο MUSCIDA (mŭ′sĭ-dȧ), a corrupt form of the mediaeval Latin musum or musus, "the mouth, muzzle, or distended jaws (of an animal). $3^m.47$ G1

80 *ALCOR (ăl′kôr), from the Persian خوار, Khwār, "the abandoned or friendless one," similar in meaning to السهى or السها, as-Suhā, the ancient and well-known Arabic name of the star. $4^m.02$ A1n

URSA MINOR (UMi)

α *POLARIS (pō̇-lā′rĭs), from the Latin stella polaris, "the pole star," which it has been from about 300 A.D. Polaris will be nearest the north pole of the heavens during the year 2102, at a distance of about 27' 37". var cF7v

β KOCHAB (kō′kăb), from the Arabic الكوكب الشمالى, al-Kaukab ash-Shamālī, "the north star," so named during the period when it was the brightest star near the pole, from about 1500 B.C. to 300 A.D. $2^{m}.24$ K5

γ PHERKAD (fĕr′kăd), from the Arabic الفرقد, al-Farqad, "the calf." β and γ UMi were known as الفرقدان, al-Farqadāni, "the two calves," β having been called انور الفرقدان, Anwar al-Farqadāni, "the more brilliant one of the two calves," and γ, اخفى الفرقدان, Akhfā al-Farqadāni, "the more concealed one of the two calves." In popular story β and γ were also called ندمانى جذيمة, Nadmānai Jadhīma, "the two pot companions of Jadhīma," a famous king of the Arabs in ʿIrāq, who would drink with the Farqadāni only, and never with mortal men! $3^{m}.14$ A2ne

VIRGO (Vir)

α *SPICA (spī′kȧ), from the Latin, "the ear of corn." The ancient Arabs called this star السماك الاعزل, as-Simāk al-Aʿzal, "the unarmed prop," Arcturus being "the armed prop." $1^{m}.21$ B3n

β ZAVIJAVA (zăv′ĭ-jăv′ȧ), from the Arabic زاوية العوّاء, Zāwiyat al-ʿAwwā', "the corner of the barking dog," al-ʿAwwā' being the name of the 13th L.M., which consisted of β, γ, δ, ε, and η Vir. This name, which remained a mystery to scholars for centuries, shows the influence of ancient Babylonian astronomy, in which θ Leo was called kakkab Zibbat Kalbi Ari, "the tail of the dog of the lion." $3^{m}.90$ F8

γ PORRIMA (pŏr′ĭ-mȧ), the name of a Roman nymph or goddess of prophecy and child-birth, and one of the companions, or one of the ancient attributes, of Carmenta, the leader of the Camenae. $2^{m}.90$ Fo

ε VINDEMIATRIX (vĭn-dē′mĭ-ā′trĭks), from the Latin, "the female grape-gatherer." $2^{m}.95$ G6

η ZANIAH (zān′yȧ), from the Arabic الزاوية, az-Zāwiya, "the corner." $4^{m}.00$ Ao

ι SYRMA (sĭr′mȧ), from the Greek σύρμα, "the train." $4^{m}.16$ F5

time is due in great measure to the generosity of my sister, Gladys D. Simson.

NOTES

[1] Vol. L, pages 356-364.

[2] *Ibid.*, page 353.

[3] For a good description of the position of the ancient Arabs with reference to Babylonia and Egypt, see de Lacy O'Leary's *Arabia Before Muhammad*, pages 43 and 44 (New York, 1927); and consult also Stephen H. Langdon's excellent "Semitic Mythology" in *"The Mythology of All Races*, Vol. V, pages 1-5 (Boston, 1931).

[4] I am indebted to Professor Philip K. Hitti for this very pat comparison; see his scholarly and exciting *History of the Arabs*, pages 269, 271, 337, and 419 (London, 1937).

[5] *Harvard Annals*, 91-99, 1918-1924.

BUFFALO, NEW YORK, OCTOBER 1, 1943.

Planetary Phenomena in 1944

By WILLIAM A. CALDER

NOTE: Greenwich Civil Time is used unless otherwise stated. To obtain Eastern War Time, subtract 4 hours, Central War time, 5 hours, etc. The data have been taken from the *American Ephemeris and Nautical Almanac*. A complete description of the four penumbral eclipses has been given by Alexander Pogo in the August, 1943, issue of POPULAR ASTRONOMY, from which information concerning these events has been taken.

ECLIPSES

Theoretically, there will be six eclipses in 1944, two of the sun and four of the moon. The lunar eclipses, however, are all penumbral. This means that the moon does not enter the central cone of the earth's shadow. In only one case, that of December 29, is the diminution of light sufficient to become apparent to the naked eye. For the smaller eclipses, a hypothetical observer suitably located on the moon would see the earth take a small nick out of the sun's disk. These grazing eclipses take place on February 9, July 6, and August 4 and are worthy of being noted inasmuch as they are in the beginnings and endings of saros cycles. But from the viewpoint of the amateur observer, we may say that 1944 offers three eclipses:

I. A total eclipse of the sun will occur on January 25, 1944. As may be seen in Figure 1, the path of totality begins in the Pacific Ocean some 2500 miles west of South America, and about 3 degrees north of the equator. The track runs across Peru and Brazil, crosses the Atlantic and ends in Africa.

Circumstances of the Total Eclipse of the Sun, January 25, 1944:

Greenwich Civil Time		d	h	m	Longitude ° ′	Latitude ° ′
Eclipse begins	January	25	12	48.3	99 12	— 0 31
Central eclipse begins		25	13	44.9	111 59	3 23
Central eclipse at local apparent noon		25	15	29.3	49 15	— 7 23
Central eclipse ends		25	17	7.6	— 9 23	18 48
Eclipse ends		25	18	4.2	3 16	14 56

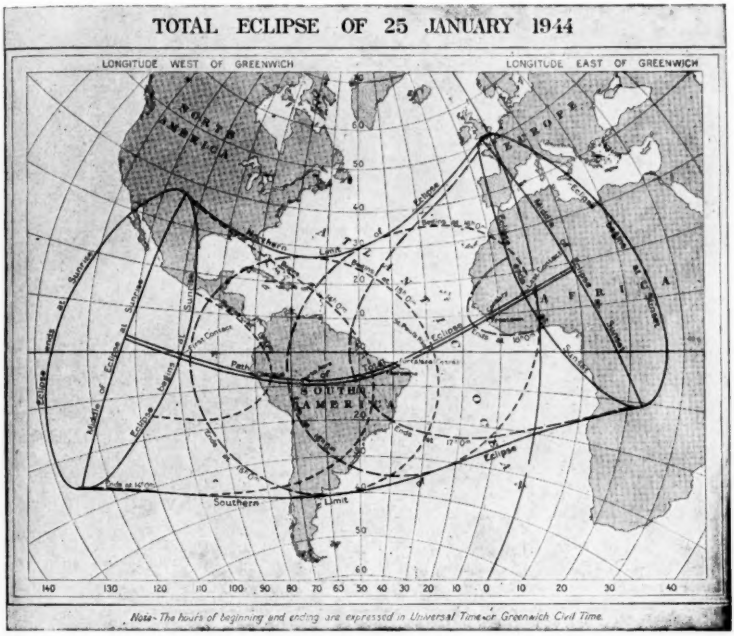

FIGURE 1

II. An Annular Eclipse of the Sun, July 20, 1944. A glance at Figure 2 reveals that this will be observed by the largest eclipse expedition of all time. It must be admitted, however, that the primary interest of the participants is in creating a total eclipse of the Rising Sun, rather than observing the annular eclipse of the sun. On July 20, the beginning of the track of the central shadow of the moon is in Uganda. The path proceeds across Ethopia and Somaliland, crosses the Arabian Sea, India, Burma, the Philippines, and ends near Rabaul. The apparent radius of the sun will be 15′ 44″.4 whereas that of the moon will be 15′ 1″.4.

Circumstances of the Annular Eclipse of the Sun, July 20, 1944:

Greenwich Civil Time	d	h	m	Longitude ° ′	Latitude ° ′
Eclipse begins	July 20	2	42.7	— 49 20	4 5
Central eclipse begins	20	3	47.3	— 33 25	3 30
Central eclipse at local apparent noon	20	5	43.1	— 95 46	19 0
Central eclipse ends	20	7	38.3	—154 20	— 6 57
Eclipse ends	20	8	43.0	—138 23	— 6 21

III. A penumbral eclipse of the moon will occur on December 29, 1944. This will be visible in arctic and northwestern parts of North America, the Pacific Ocean, Polynesia, New Zealand, Australia, the Indian Ocean, Asia, eastern and northern Europe, and northern Greenland. The northern limb of the moon will approach to within three-tenths of a minute of arc of the umbral shadow of the

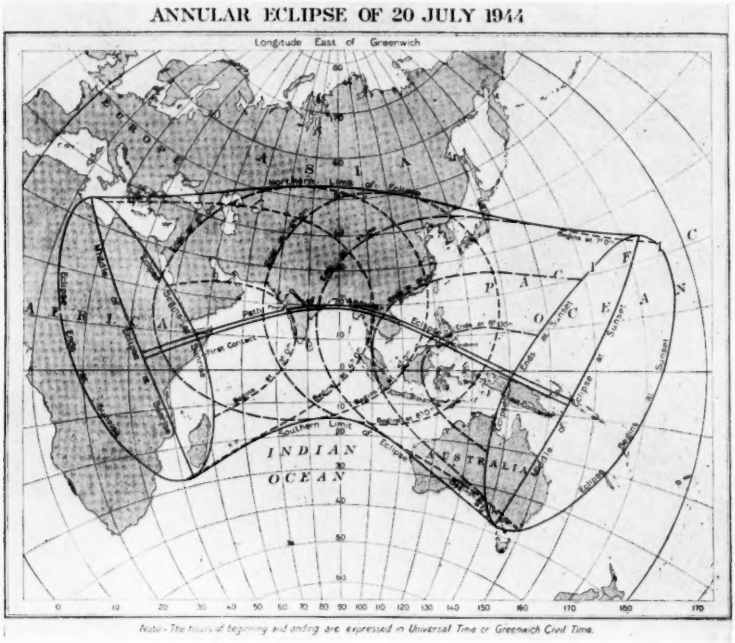

FIGURE 2

earth, giving the moon a flattened appearance. The moon enters the penumbra at $12^h\,33^m$, G.C.T., and leaves at $17^h\,5^m$. The middle of the eclipse will occur at $14^h\,49^m$ when the moon will be in the zenith of Australia.

VISIBILITY OF THE PLANETS

To show the trend of observing conditions for the four planets of greatest telescopic interest, Venus, Mars, Jupiter, and Saturn, during the course of the year, Figure 3 has been prepared. This chart shows the number of night hours during which each of these planets is above the horizon. Although the data are plotted for an observer at 40° north latitude, the general run of things will be similar all over the earth. For example, a glance shows that the summer is a poor time for stalking these planets. Venus is of course visible in daylight, but inasmuch as observations are better when the planet is not close to the sun, the curve for Venus will apply to daylight as well as night viewing.

More detailed information concerning the wanderings of the planets is given in Figure 4, which shows for any date the difference in right ascension between the planets and the sun. The planet is a morning star when its graph is to the right of the zero line, and an evening star when its graph is to the left. When the curve of a planet cuts the center line, the planet is in conjunction with the sun. When the curve cuts the 12 hour line (which is possible only for the superior

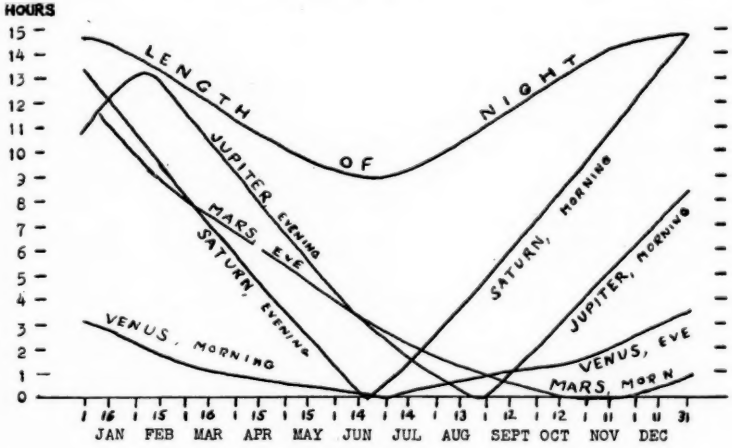

FIGURE 3

planets) opposition occurs. When two curves intersect, the corresponding planets are in conjunction on the given date. Inasmuch as the declination of a planet often has much to do with its availability for satisfactory observing, numbers indicating the declinations are distributed along the graphs.

Mercury. It is somewhat heartening to see Mercury darting around the sun in 88 days, perfectly unconcerned about rubber shortages or gas rationing. There may be a lot of black marketing going on in its dark hemisphere which is always turned away from the sun. Mercury does its best to avoid being seen by terrestrial observers, and can nearly escape detection except during the short periods when it is near its greatest elongation from the sun. Because of the eccentricity of its orbit, some elongations are wider than others. As a general rule, Mercury is best seen by observers in the northern hemisphere as an evening star at such eastern elongations as occur in March and April, and as a morning star in September and October. This is because of the fact that the inclination of the ecliptic to the horizon varies during the year. The phenomenon of the harvest moon also is related this fact.

GREATEST ELONGATIONS OF MERCURY FROM THE SUN IN 1944

Eastern Elongation (Evening Star)						Western Elongation (Morning Star)					
	Distance from Sun						Distance from Sun				
Date	h	°	′	Decl.	Mag.	Date	h	°	′	Decl.	Mag.
April 12	10	19	36	+18°0	0.5	Jan. 31	19	25	7	−21°6	0.1
Aug. 10	14	27	25	+ 4.2	0.6	May 29	20	24	43	+12.6	0.7
Dec. 5	2	21	9	−25.6	−0.3	Sept. 22	23	17	52	+ 7.9	0.0

Venus. The planet Venus will attain neither its greatest brilliance nor elongation from the sun in 1944. It divides evenly its favors between morning and evening skies. In the first part of the year, Venus is a conspicuous morning star (stellar magnitude −3.7) with .7 of its apparent disk illuminated, and rising

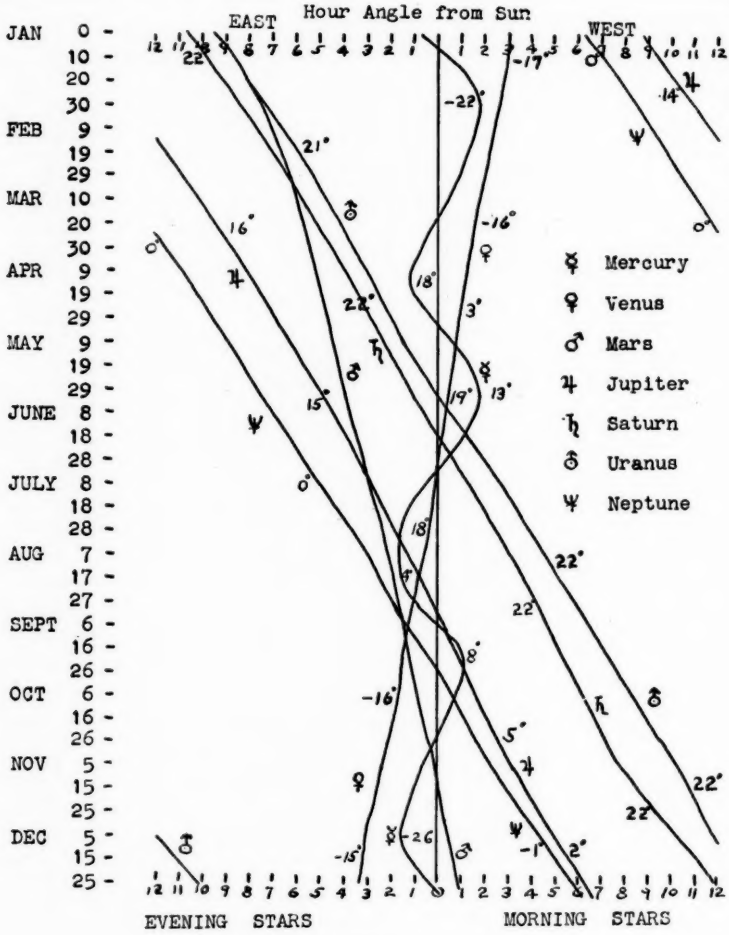

Fig. 4 Visibility of Planets in 1944

about 3 hours before the sun. It gradually moves eastward until its passes behind the sun (at superior conjunction) on June 27. During the remainder of the year, it is an evening star.

Venus will be occulted by the moon on February 21 and on December 19. The first occultation will be visible in the afternoon in central and western United States. At longitude 91° west and latitude +40°, immersion will occur at 3:43 Central War Time. The moon will set before emersion takes place. At longitude 120° west, latitude 36° N., immersion and emersion will occur at 2:25 and 3:38, respectively, Mountain War Time. The occultation of December 19 will be

visible between the limiting parallels of +38° and —24°. Geocentric conjunction of Venus with the center of the moon will occur at $19^d\ 0^h\ 0^m5$, when the moon will be on the meridian of west longitude 115°.

VENUS AS MORNING STAR IN 1944

Date	Distance (millions of miles)	Angular Diameter	Fraction of Disk Illuminated	Mag.
Jan. 1	95	16″.5	.700	—3.7
31	113	13.8	.792	—3.5
Mar. 1	129	12.2	.865	—3.4
31	142	11.0	.921	—3.3
Apr. 30	153	10.2	.964	—3.3
May 30	160	9.8	.991	—3.4

Superior conjunction will occur June $27^d\ 4^h$.

VENUS AS EVENING STAR IN 1944

July 4	161	9.7	.999	—3.5
Aug. 3	157	9.9	.984	—3.4
Sept. 2	149	10.5	.949	—3.3
Oct. 2	138	11.3	.899	—3.3
Nov. 1	123	12.7	.836	—3.4
Dec. 1	106	14.7	.759	—3.5
Dec. 31	87	17.9	.662	—3.7

The *Earth* is in perihelion on January $4^d\ 18^h$ and in aphelion July $3^d\ 6^h$. The seasons begin as follows:

		d	h	m
Spring	Mar.	20	17	49
Summer	June	21	13	3
Autumn	Sept.	23	4	2
Winter	Dec.	21	23	15

Mars. Mars will be a conspicuous evening star during the first part of 1944, having just passed opposition. The motion is retrograde (westward) until January 10, from which time it follows the ecliptic from its position near the Hyades, eastward until it ends the year in Sagittarius.

Data concerning Mars in 1944 are listed in the following table which is self-explanatory except for the column under "P," which is the position angle of the axis of rotation, measured eastward from the north point of the disk. The distances listed are in millions of miles from the earth.

MARS IN 1944

Date 0^h G.C.T.	Distance	Angular Diameter	Center of Disk Lat.	Center of Disk Long.	P	Mag.
Jan. 1	60	14″.4	—11°	329°.29	325°	—1.0
Feb. 2	84	10.4	—10	35.13	326	0.0
Mar. 1	109	8.0	— 6	130.98	329	0.6
April 2	139	6.3	1	185.48	336	1.2
May 2	165	5.3	8	257.16	344	1.6
June 1	188	4.6	14	327.34	354	1.8
July 1	189	4.2	20	35.94	5	1.9

For the remainder of the year, Mars is too remote, and too near the sun to be of interest. Mars is in conjunction with the sun on November 14, when its distance from the earth is 235 million miles. The greatest distance from the earth occurs on October 16, when it is 237 million miles distant. The planet is in conjunction with Uranus on January 20, Jupiter on July 5, and Venus on September 10.

Jupiter. In the early days of 1944, Jupiter is very near Regulus, and moving westward. On April 13, the planet halts its retreat and swings eastward, entering

Virgo in November. Jupiter is in opposition with the sun on February 11, 22^h when its distance from the earth is approximately 406 million miles. At this time, the polar diameter subtends an angle of 42″.

There will be six occultations of Jupiter by the moon in 1944, three of which will be visible (weather permitting) in the United States. In the following table, T is the G.C.T. of geocentric conjunction of Jupiter and the moon in right ascension. H is the common geocentric hour angle of the moon and planet, counted from the meridian of Greenwich, positive toward the west and negative toward the east. The limiting parallels refer to the zone of latitude in which the event is visible.

	T	H	Limiting	Parallels
	h m	h m		
Jan. 13	11 8.8	8 43.3	90	16
Feb. 9	11 27.1	11 0.4	62	— 9
Mar. 7	11 0.3	—11 26.9	40	—25
April 3	13 39.4	— 6 53.5	41	—24
April 30	21 30.1	2 43.7	65	— 4
May 28	10 13.2	— 6 54.4	90	29

OCCULTATIONS OF JUPITER VISIBLE IN UNITED STATES

Date	Place		Immersion h m	Emersion h m
Jan. 13	Washington	° ′	12 4.4	13 6.0
	Long. 72 30	Lat. 42 30	11 59.1	13 0.7
	91 0	40 0	11 55.9	12 59.1
Feb. 9	120 0	36 0	12 21.2	12 52.4
April 30	Washington		19 46.4	20 59.0
	Long. 72 30	Lat. 42 30	19 52.4	21 11.6
	91 0	40 0	19 36.2	20 44.4
	120 0	36 0	.. ....	20 29.5

Saturn. This favorite object of many telescopists will be unusually well situated for observing in 1944. In January, it has just passed opposition and shines brightly in Taurus. The rings are open to practically their fullest extent. Starting near ζ Tauri, Saturn moves westward about 3° until it becomes stationary in right ascension on February 20. In the following eastward swing, Saturn enters the long rectangle of Gemini. It again becomes stationary on October 23, and is in opposition with the sun on December 29. The oppositions of December, 1943, and December, 1944, are exceptional, because not only is the planet's distance from the sun nearly the minimum possible, but the rings are widely opened. Maximum opening occurred in 1943; the extent of opening is but one degree less in 1944.

There will be six occultations of Saturn in 1944, none of which is visible in the United States.

	T	H	Limiting	Parallels
	h m	h m		
Aug. 14	20 3.0	11 6.2	—35°	—68°
Sept. 11	6 23.1	— 0 56.2	— 6	—68
Oct. 8	15 42.4	10 5.1	17	—37
Nov. 5	0 20.2	— 3 29.3	32	—20
Dec. 2	7 56.9	6 0.5	35	—19
Dec. 29	13 44.5	—10 15.5	23	—32

Uranus. The path of Uranus is shown in Figure 5. The planet will spend the entire year in Taurus, and is easy to find with a pair of opera glasses. It appears as a star of magnitude 5.9. A four-inch telescope reveals its greenish disk with a diameter of less than 4″ of arc. Uranus is stationary on February 12

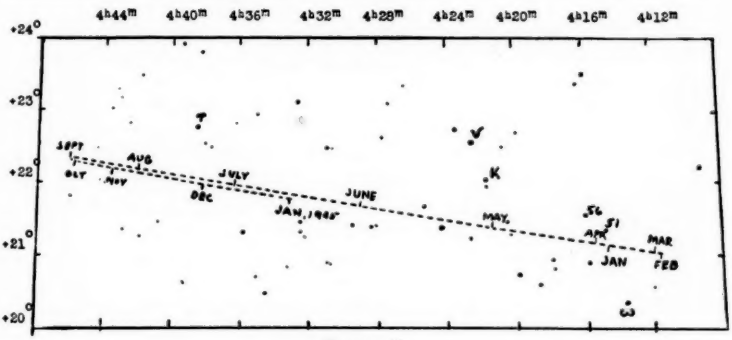

FIGURE 5
PATH OF URANUS IN 1944

and September 18. Conjunction with the sun occurs on May 30, and opposition on December 3. The distance from the earth at opposition will be about 1700 million miles.

Neptune. Neptune's path is shown in Figure 6. The planet is easy to find

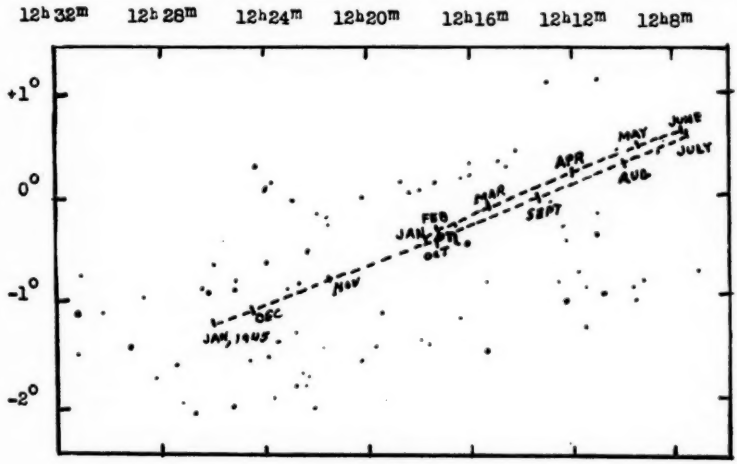

FIGURE 6
PATH OF NEPTUNE IN 1944

with binoculars (magnitude 7.7) in January and February when it is very near η Viriginis. Neptune is stationary in right ascension on January 6 and June 12. Opposition with the sun occurs on March 23, when its distance from the earth is about 2,720 million miles.

Pluto will spend another quiet year in Cancer. Its exact position is a military secret, as far as this writer is concerned.

The Planets in February, 1944

By WILLIAM A. CALDER

NOTE: Greenwich Civil Time is used unless otherwise stated. To obtain Eastern War Time, subtract 4 hours; Central War Time, 5 hours, etc. The information is taken from the *American Ephemeris and Nautical Almanac.*

Sun. The apparent position of the sun on February 1, 0^h is $\alpha = 20^h\,53^m9$, $\delta = -17°\,28'3$ (in Capricornus). On February 29, 0^h its position is $\alpha = 22^h\,43^m5$, $\delta = -8°\,5'3$ (in Aquarius).

Moon. The moon will be farthest from the earth on February 10 at 7^h, and nearest the earth on February 23, 23^h. The phases are:

	d	h	m
First Quarter	Feb. 1	7	8
Full Moon	9	5	29
Last Quarter	17	7	42
New Moon	24	1	59

Mercury. Mercury is at greatest western elongation just five hours before the beginning of the month, but its low declination will make it difficult to see in northern latitudes. It is interesting to know that all of the planets (even Pluto) are above the horizon in the morning around February 1. Mercury is in aphelion on February 16.

Venus is a brilliant object (—3.5) in the southeastern morning sky, rising about 2½ hours before the sun at the beginning of the month, and 2 hours at the end of the month. Information about the occultation of Venus on February 21 is given in the preceding article of this issue of POPULAR ASTRONOMY.

Mars is a brilliant object in Taurus. It is in conjunction with the moon on February 3 at 6 hours, when it is about 7 degrees north of the moon.

Jupiter is just in front of the sickle of Leo. Information about its occultation by the moon on February 9 is given in the preceding article. Jupiter is in opposition with the sun on February 11 at 22 hours.

Saturn is part of the brilliant spectacle which also includes Mars, Jupiter, and many of the brightest stars of the sky. A conjunction with the moon occurs on February 4, 7^h, with Saturn 2½ degrees north of the moon. Saturn is stationary in right ascension on February 20.

Uranus may be found by consulting the chart of its path which appears on page 37 of this issue of POPULAR ASTRONOMY. It is stationary in right ascension on February 20 and thereafter until September 18 its motion is eastward.

Neptune is near η Viriginis on February 1. Its path for the year is shown in the chart on the preceding page. The moon passes 3° 12′ north of Neptune on February 12 at 21 hours.

Asteroid Notes

By HUGH S. RICE

Vesta as usual has been an easy object in binoculars for the past few weeks. It passed by Aldebaran on schedule (see former Notes), and was most readily picked up by other observers as well as ourselves. Dr. Clyde Fisher observed the asteroid when it was but a few minutes of arc from the star. He saw it

"immediately" upon looking in his 6x and his 10x binoculars. Members of the Junior Astronomy Club of this city also found the asteroid, by means of field-glasses. Vesta is in conjunction with Aldebaran for the third time during this apparition, about March 1. However, on the last occasion, the asteroid is about 4° north of the star.

Four of the subjoined ephemerides are continuations of those formerly given, and the other one is for Hebe, which comes to opposition during the latter part of February. For February 1, the apparent visual magnitudes are probably about as follows: Pallas, 8.7; Vesta, 8.7; Euterpe, 10.2; Ceres, 8.0; Hebe, 9.6.

The ephemeris of Euterpe should have a correction of about 1^m in R.A. We discovered in late November that, when we plotted the observed position on the star chart, this observed position in R.A. was about 1^m greater than the computed position as given, the effect being that the planet was actually about 1 day "behind" its scheduled place, going in a retrograde direction. This fact is confirmed by the Yale University computers, to whom we are indebted for the ephemerides.

Just before these Notes were mailed we observed with the Zeiss binoculars: Euterpe, which was 1^m "behind" its predicted place, the visual magnitude being estimated as 9.2; Vesta, of magnitude 7.9 or 8.0; and Ceres, of magnitude 7.5. It will be noticed that Ceres is now brighter than Vesta.

ASTEROID EPHEMERIDES FOR 0^h U.T.

2 PALLAS

1944	α h m	δ ° ′
Jan. 26	1 33.7	−17 28
31	1 39.3	−16 46
Feb. 5	1 45.3	−16 2
10	1 51.7	−15 18
15	1 58.3	−14 32
20	2 5.3	−13 47

4 VESTA

1944	α h m	δ ° ′
Jan. 16	4 12.4	+17 16
21	4 11.6	+17 32
26	4 11.5	+17 49
31	4 12.2	+18 7
Feb. 5	4 13.6	+18 27
10	4 15.7	+18 47
15	4 18.4	+19 8
20	4 21.8	+19 30

27 EUTERPE

1944	α h m	δ ° ′
Jan. 26	4 28.5	+21 46
31	4 31.2	+21 57
Feb. 5	4 34.9	+22 9
10	4 39.3	+22 22
15	4 44.6	+22 36
20	4 50.5	+22 50

1 CERES

1944	α h m	δ ° ′
Jan. 26	5 38.3	+28 19
31	5 36.3	+28 29
Feb. 5	5 35.0	+28 37
10	5 34.6	+28 45
15	5 35.0	+28 52
20	5 36.2	+28 59

6 HEBE

1944	α h m	δ ° ′
Jan. 16	11 9.2	+ 9 14
21	11 8.1	+ 9 50
26	11 6.5	+10 31
31	11 4.2	+11 16
Feb. 5	11 1.2	+12 4
10	10 57.8	+12 55
15	10 54.0	+13 48
20	10 49.8	+14 40

Hayden Planetarium, American Museum of Natural History, New York, New York, December 29, 1943.

Occultation Predictions for February, 1944

The quantities in the columns *a* and *b* are given for the purpose of making these predictions useful for any place within 200 miles of the point indicated. The procedure is as follows: Subtract the longitude of the point given from the longitude of the place in question; multiply the result in degrees, taking the signs into account, by the quantity under *a* for the star to be observed; similarly,

with the latitude, using *b*; apply the sum of the products, with its proper sign, to the Greenwich C.T., and obtain the predicted Greenwich Civil Time for the phenomenon at the place of observation. To obtain Eastern Standard Time it is necessary to subtract five hours; Central Standard Time, six hours, etc.

(Taken from the *American Ephemeris*)

Date 1944	Star	Mag.	IMMERSION Greenwich C.T.	*a*	*b*	Angle E from N	EMERSION Greenwich C.T.	*a*	*b*	Angle E from N
			h m	m	m	°	h m	m	m	°
	OCCULTATIONS VISIBLE IN LONGITUDE +72° 30′, LATITUDE +42° 30′									
Feb. 4	*m* Taur *m*	5.0	0 39.5	—1.3	+4.0	24	1 32.5	—2.6	—3.0	309
4	57 Orio	5.9	21 16.7	0.0	+2.8	40	22 11.5	—1.3	+0.4	295
5	64 Orio	5.2	2 48.9	..	..	152	3 26.5	..	..	202
5	χ^2 Orio	4.7	3 6.2	..	..	31	3 52.7	..	..	325
5	68 Orio	5.7	7 31.3	0.0	—1.7	108	8 28.3	+0.1	—1.0	259
7	209 B.Gemi	6.1	5 22.1	—1.2	—2.6	135	6 31.3	—1.7	—0.5	251
7	θ Canc	5.6	22 17.4	—0.4	+0.1	131	23 6.8	0.0	+2.5	234
12	*b* Virg.	5.2	11 30.6	—0.7	—1.7	109	12 36.6	—0.2	—2.0	299
29	BD+11°445	5.9	3 18.6	+0.1	—2.0	115	4 2.9	—0.1	+0.2	220
	OCCULTATIONS VISIBLE IN LONGITUDE +91° 0′, LATITUDE +40° 0′									
Feb. 3	63 Taur	5.7	5 44.6	—1.3	+2.2	23	6 20.3	0.0	—4.2	320
4	*m* Taur *m*	5.0	0 17.3	..	..	1	0 43.6	..	..	324
5	64 Orio	5.2	2 16.0	..	..	162	2 31.8	..	..	181
5	χ^2 Orio	4.7	2 21.9	—1.7	+3.4	38	3 26.2	—2.4	—2.5	307
5	68 Orio	5.7	7 34.6	—0.2	—2.8	135	8 24.1	—0.8	0.0	232
7	209 B.Gemi	6.1	5 9.1	..	..	170	5 40.8	..	..	210
11	308 B.Leon	5.9	10 53.1	..	..	52	11 26.3	..	..	1
12	*b* Virg.	5.2	11 18.7	—1.0	—2.1	130	12 31.7	—0.9	—1.8	284
17	49 Libr.	5.5	12 42.5	—2.0	—0.7	110	14 7.8	—1.9	—1.2	286
20	33 Sgtr.	5.8	12 22.5	—1.7	+1.6	68	13 30.9	—1.5	—0.2	301
21	Venus	—3.4	20 43.6	—0.3	—0.6	65	.. ..	..	..	..
29	BD+11°445	5.9	3 25.2	—0.2	—4.6	140	3 52.3	—0.8	+3.0	191
	OCCULTATIONS VISIBLE IN LONGITUDE +120° 0′, LATITUDE +36° 0′									
Feb. 1	8 B.Taur	6.2	23 47.7	—2.0	+0.6	104	0 46.4	—0.7	+3.1	203
3	63 Taur	5.7	4 51.2	—1.9	+1.6	47	6 6.0	—1.8	—1.9	285
5	64 Orio	5.2	1 2.8	—1.6	0.0	122	1 55.5	—0.4	+3.3	212
5	χ^2 Orio	4.7	1 45.1	..	..	9	2 13.9	..	..	325
6	ζ Gemi	3.9	7 3.4	..	..	7	7 5.7	..	..	4
7	10 H.Canc	6.1	12 19.9	+0.3	—2.4	141	13 6.6	—0.2	—0.6	246
9	Jupiter	—2.1	12 21.2	—2.1	+0.9	49	12 52.4	+0.8	—4.2	356
11	308 B.Leon	5.9	9 46.3	—2.1	—1.2	118	11 17.2	—1.8	—1.9	303
14	80 Virg.	5.8	14 20.4	—1.1	—2.8	155	15 22.8	—1.6	—1.0	258
17	49 Libr.	5.5	12 4.7	—0.4	—1.9	161	13 1.0	—2.8	+1.5	247
20	π Sgtr.	3.0	20 36.3	+0.1	+1.5	23	21 11.9	—1.8	—3.3	318
21	Venus	—3.4	20 25.2	—0.9	+0.8	37	21 27.8	—1.8	—2.0	291

METEORS AND METEORITES

Meteor Notes from the American Meteor Society

By CHARLES P. OLIVIER, President

The number of reports for the fall months fell to a minimum compared to recent years. This is of course understandable when it is remembered that most of our active observers are young or middle-aged men and that their time is fully taken up by military duties or some other form of war effort. However, a good

many new members have joined recently and I hope that 1944 will give better totals than 1943 so far promises. May I call the attention of all our members who joined previous to October 1 last that their 1944 dues should be paid without forcing the sending of bills. This would help us by saving both time and needless expense.

It seems inevitable that I will very shortly be needed to aid in certain problems connected with our army. This addition to the work I am already doing will make it more difficult to prepare Meteor Notes for the coming months. If they are hence very short, cover fewer important subjects, or are actually missing at intervals, I beg the indulgence of our members. They can be assured that this condition will be temporary. In no case should it be made an excuse for their letting up in the regular meteor work, or for others to cease sending in their very valuable fireball reports. Recently I have been able to finish the cases of only two fireballs, which follow. A very large number of others have been partly solved by Miss Reilly but the solutions have not yet been checked and completed. An even larger number of cases with reports from only two ships turn out to be unsolvable, due, I believe, much more to carelessness in giving the ships' positions in longitude and latitude rather than to poor observations of the fireball itself. Incidentally, the war has for the past two years stopped such reports from ships entirely—another real loss to the A.M.S.

Fireball of 1938 November 4/5

At about 8:25 P.M., E.S.T., on this date a splendid fireball was observed to the west of Rutland, Vermont, and notices put in local papers brought in 9 reports from Vermont and one from Massachusetts. Unfortunately, I was unable to secure any from eastern New York, over which state I believe that the path of the fireball mostly or wholly lay. The 10 observations have been plotted but are hopelessly discordant. All that can be concluded about the path is that the fireball must have appeared (from Rutland) at an altitude of perhaps 60°, fell at a steep angle (perhaps 70° to the horizon), and ended in the northwest in an explosion at an altitude of 5°±, but pieces of the main body certainly fell lower. The body was probably 15′ in apparent diameter, at least when exploding, and was comparable in brightness to the Moon. It was blue-white, lasted 4 seconds, and left a yellow train of short duration. While no heights can be computed from the data at hand, the phenomena indicate a low bursting point with the consequent chance for meteorites falling. The only sound reported, by one or two observers, was within a few seconds, and was probably illusory, as so frequently happens. As the end point cannot be determined I am unable to suggest the locality in which fragments may have fallen, but the fireball was brilliant enough to justify the publication of this brief account.

Bright Meteor of 1941 February 8/9

This meteor was observed at 11:58 ± 1, P.M., E.S.T., on the above date by A. R. Sharpless at Drexel Hill, Pennsylvania, S1, $\lambda = 75° 17'$, $\phi = 39° 56'$, and by Welden Becroft at Yale Observatory, New Haven, Connecticut, S2, $\lambda = 72° 55'$, $\phi = 41° 19'$. At S1 it was "extremely bright," at S2 "blue, like Sirius." S1 gives a full description of the path from which coordinates can easily be derived. S2 gives a rough drawing and description from which somewhat less certain coordinates were found. These were $h_1 = 35°$, $a_1 = 227°$, $h_2 = 46°.6$, $a_2 = 65°$ for beginning points; $h_1 = 10°$, $a_1 = 220°$, $h_2 = 26°$, $a_2 = 88°$ for end point. Using

the graphical solution method we then derive:

Date	1941 February 8/9 11:58 P.M., E.S.T.
Sidereal time at end point	139°.6
Began over	$\lambda = 73°\ 52'$ W; $\phi = 40°\ 58'$ N, at 106.2 ± 11.3 km
Ended over	$\lambda = 73°\ 47'$ W; $\phi = 41°\ 17'$ N, at 36.8 ± 0.4 km
Length of path	77 km
Projected length of path	34 km
Radiant (uncorrected)	$a = 10°$, $h = 63°.9$
	$\alpha = 135°$, $\delta = 15°.5$

No estimate of velocity was made. As the radiant was near the zenith and not near the anti-apex, it seemed useless to calculate any zenith correction, which would be small in any case.

Flower Observatory, Upper Darby, Pennsylvania, 1943 December 21.

Contributions of the Society for Research on Meteorites

Edited by FREDERICK C. LEONARD
Department of Astronomy, University of California, Los Angeles 24

Finding a New Meteorite

H. H. NININGER*
American Meteorite Laboratory, Denver, Colorado

ABSTRACT

Following is an account of the incidents relevant to the discovery of several new meteorites, in particular a small stony specimen (an aerolite) weighing about 4 pounds, found recently on a farm in the northern part of Cowley County, Kansas.

While lately scouting a prospective oil structure in the northern part of Cowley County, Kansas, I went into a farmhouse yard to get a drink of water. While pumping a drink, I was, as always, scanning the premises for odd-looking stones. Under some plum bushes a few steps away I noticed a rusty-looking chunk of rock about the size of my two fists and at once decided that it needed investigating. Having finished with the pump, I stepped over and picked up the rock, which was evidently a badly weathered stony meteorite (an aerolite), weighing approximately 4 pounds. I took it to the house and inquired as to its source and whether the inhabitants knew what it was. The occupants were tenants who had been on the place only a year; they had no knowledge of how the stone had come there and no concern whatever about it except apparently to wonder why anyone should be interested in such an object! I explained that it was a meteorite and that to me such things were all important. Asking whether I might purchase it, I was gladly granted that privilege. For the price of one dollar, I became the proud possessor of a new meteorite!

It is not often that the *student* of meteorites has the good fortune actually to come upon a meteorite in the field, without some other person's leading him

*[With the coming of the war, Dr. Nininger temporarily laid aside his meteoritical program. He is now serving as field representative for an oil company. In the course of his work in that capacity, the discovery reported on in this paper was made. The Editor of *C.S.R.M.* requested him to furnish an account of the incident for publication.—ED.]

to it. In this case it is quite likely that the stone in question had been thrown there by someone who had found it out in a field, but of that possibility I cannot be certain. In any event, the specimen represents a completely new find. No other meteorite has been reported from any point nearer than about 50 miles, and this stone is readily recognized as belonging to a different fall from even those nearest finds.

I have several times picked up meteorites in the field which had evidently never been discovered by anyone else; usually, however, these finds were made in areas where I knew there had been a fall, and I was out for the express purpose of finding additional individuals of the known shower. I recall picking up a beautiful individual of the Beardsley, Kansas, fall of 1929 October 15. I found my stone in 1932. I have picked up also several stones of the Holbrook, Arizona, shower of 1912 July 19, some 20 years after the fall occurred. One of these stones was a very fine specimen of about 1000 grams. Moreover, while near the village of Xiquipilco, Mexico State, Mexico, I spied a small iron projecting a few millimeters from the ground and recovered a specimen of about 2 pounds. At the Odessa, Texas, Meteorite Crater, several irons were picked up by me and other members of my family without the aid of instruments of any kind. On 2 occasions in my 20 years of meteorite collecting I have come across meteorites in *rock gardens!* In both instances the specimens discovered represent previously unknown falls; in one instance, the find was a specimen of 6¼ pounds, and in the other, it consisted of 3 small stones that had been set in the top of a cement wall along with other decorative pebbles! Five of the Plainview, Texas, stones were discovered and collected by me from the soil, while a sixth one was sighted under the road-side fence as I drove by. I have kept no record of the number of Canyon Diablo, Arizona, irons that I have picked up in the field without the aid of instruments, or of the number of oxidized pallasites (meteorodes) from the Brenham Township, Kiowa County, Kansas, field. The number, in each case, must run close to a thousand. Of course, the largest number of meteorites collected directly from the soil, with which I have had anything to do, were recovered by means of a device that I have called a *magnetic rake.* With this instrument we have collected many thousands of small specimens near the Canyon Diablo (Barringer) Crater and from the rim of the Odessa Crater. We have collected a few small specimens likewise from the Plainview shower and at least one from the Holbrook shower, by aid of this device. We are looking forward to the time when conditions will again permit the pursuit of such activities as meteorite collecting!

Concerning the Meteor Observed on January 30, 1868, which Fell thru the Atmosphere as a Shower of Stones at Pultusk in the Kingdom of Poland

J. G. Galle [1812-1910]
Translated by Walter H. Haas

[*Continued from the November, 1942, Issue**]

The Reduction of Planetary Velocity and the Change of Motion Incident upon the so-called Bursting of the Meteor[ite]

If it is agreed that intercomparison of all observations heretofore discussed justifies the conclusion that the straight-line path thru the atmosphere, calculated

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C.S.R.M.*, **3, 58; *P. A.*, **50**, 509, 1942.

on the basis of the Danzig and Breslau observations, corresponds very closely to the true path, then we may proceed to consider the final question as to what influence the so-called bursting of the meteor[ite] and the scattering of the individual meteor[itic] stones had upon the direction of the path, which, up to now, has been regarded as rectilinear. Here the Danzig observation, according to which the meteor[ite] burst in the immediate vicinity of Sirius, supplies an unmistakable answer. If one calculates the azimuth of Sirius for the moment at which bursting occurred, one finds 313° 56′; if one calculates further the azimuth of the point of fall of the stones (assumed to be at 39° 3′ longitude from Ferro and 52° 45′ north latitude) as seen from Danzig, one has 313° 28′. The azimuth of the bursting point, 5½ miles above the Earth's surface, and that of the fall on the surface are, therefore, identical within ¼ of a mile. Therefore, the stones dropped nearly perpendicularly from the bursting point and retained only a small component of their initial forward motion. If the previous direction of motion, with an inclination of 44° to the horizontal plane, had continued, then they would have first reached the Earth's surface 5½ miles farther to the E.N.E.; or, if one wished to assume that the Danzig observation had placed the end point too far to the left, then, in order to satisfy the actual point of fall, one would have to set the error of observation at 9°, which may be described very well as quite inconceivably large.

Further Proof (thru Sound Observations) of the Vertical Descent of the Stones from the Bursting Point to the Earth

This vertical fall of the stones, from the bursting point on, finds still another very notable confirmation by the observation of the interval of time which elapsed from this luminous process up to the detonation, an interval which was observed exactly at Warsaw. According to Mr. Kowalezyk's report, this interval of time amounted to 3½ minutes. Likewise, Dr. Neugebauer reports the following about this sound phenomenon: "According to Mr. Deike's observation, the report which was heard after the meteor had vanished from sight followed the luminous appearance in 3½ minutes. The observation of an acquaintance of mine, the Director of the German Evangelical College at this place, Mr. v. Bäckmann, whose reliability is not open to doubt, appears to me to be especially valuable for your purpose in this connection. It consists of the following: at the instant when the meteor showed itself, Mr. v. Bäckmann was walking along on the western [one] of the two sidewalks of the street 'Krakau Suburb' (which runs from N.N.W. to S.S.E.) toward its southern extension, the so-called 'New World.' Astonished by the suddenly appearing bright illumination of the objects around him, the cause of which lay behind him, he quickly turned around in order to investigate the latter, and then he saw the fireball arise just above the western row of houses of the 'Krakau Suburb' and move along above the street, nearly in a northeastern direction, in a line slightly inclined to the Earth, growing more and more distant from him; finally, it was suddenly dispersed into a great quantity of spark-shaped, shining points of light above the eastern row of houses. He still looked for a couple of seconds toward the region where the phenomenon had occurred and thereafter continued on his way into the street 'New World.' Advancing with regularly measured strides and looking around again toward the region of the phenomenon three or four times for a couple of seconds only, he gradually reached the second cross-street of the main streets in question and here a thunder-like noise, lasting for a couple of seconds, and thereafter a ter-

rible crackling report, much louder than that of a cannon, first struck upon his ears. Immediately after the report, there ensued a crackling of a similar sort, and thereafter everything became and remained quiet. Since, during this observation itself, he neglected to look at his watch, Mr. v. Bäckmann later, upon my request, repeated his walk from the 'Krakau Suburb' to the 'New World,' or, if I may express it thus, he imitated his walk and this time measured its duration by means of a watch. He thereby reached the definite conclusion that the interval of time which passed between the luminous phenomenon of the aerolite and the consequent detonation had amounted to somewhat over 3 minutes." If one now calculates from the known velocity of sound, of 1023 Paris feet in 1 second, the distance corresponding to the interval of 210 seconds, one finds 9.4 geographic miles [1 geographic mile = 22,854 Paris feet, approximately]. However, precisely this distance of 9.4 miles results also if one computes the distance of the bursting point *B* [at a height of 5.6 miles as found earlier], from Warsaw, which is located at a horizontal distance of 7.5 miles from the projection of *B* on the Earth's surface. Accordingly, the explosion and the loss of the initial velocity can have occurred only perpendicularly above the territory of the fall. The assumption of a path proceeding in a fixed oblique direction up to the point of impact would bring the bursting point, which is 5½ miles high, so much closer to Warsaw that the interval of time until the detonation was heard would thereby result as too small by a whole minute, excluding even the contradiction mentioned before, between this preceding assumption and the observation at Danzig. It is natural to raise a question of possible changes in the speed of sound in a vertical direction and thru very rarefied air. However, it is to be remembered in this connection that a difference between the velocity of sounds proceeding from sources on high mountain tops and the velocity of sounds originating in sources on the plane of the observer, at or near sea level, has not been recognizable in experiments conducted up to now and that the most recent work of Regnault on this subject, published only this year, has indicated no change in the velocity of sound for different air densities, even for a fivefold change in pressure and density. Hence, there is not only no reason present for the supposition of an uncertain determination of the velocity of sound, but, instead, because the position of the bursting point was previously established accurately by a trigonometric method, one will be able to deduce from this observation a no-less-accurate confirmation of the constancy of the velocity of sound in the atmosphere up to a height of 5 miles.

Direct Observations of the Fall, Showing that the Stones Descended not with Planetary Velocity but with merely the Ordinary Velocity of Falling Bodies

The knowledge that meteor[itic] stones, by entering the lowest layers of the atmosphere, often lose completely their planetary velocity and finally fall simply like heavy bodies is nothing new; however, it would take us too far afield to collect here other examples where we have secured evidence of this relatively smaller velocity and energy of the dropping stones. In the present fall (as a consequence of the fact that the path could be calculated for this meteor), this fact is established partly by the demonstration of the transition of the oblique motion into a vertical one from the bursting point on and partly by direct observation of the fall itself. Dr. Neugebauer says on this subject in a letter received here: "One would expect that the stones must have fallen with terrible power onto the

Earth's surface. In reality, they nowhere broke thru the frozen layer of the ground, altho some penetrated deeply into it." If one calculates the time of descent and the final velocity of a falling body, starting from rest at a height of 5.6 miles, according to the law of gravitation, one finds for the duration of the fall 92 seconds and for the velocity reached at the Earth's surface 2780 Paris feet per second, where the former number is to be increased somewhat because of the resistance of the air and the latter for the same reason is to be diminished somewhat. Hence, one sees that the velocity amounts to only about 1/30 of the planetary velocity of, *e.g.*, the Earth. Furthermore, it is evident that such meteor[ite]s as are first stopped by bursting, at a height much less than 5.6 miles, can attain, in falling to the Earth, a velociy very much smaller still.

Observations of the Bursting, the Descent, and the Sound Phenomenon at Places Located Near the Point of Fall of the Stones

Altho observations of the bursting point, from the more distant places, agree well among themselves in several respects, it is more difficult to reconcile them with observations made at places lying close to the fall. Mr. Kowalcyzk reports the following on this subject: "The oral reports of the inhabitants of the village of Sokolow agree, according to Babczynski and Deike (Mr. Babczynski, a professor of mathematics, and Mr. Deike, an assistant at the Observatory, were commissioned with investigating the place of the fall on behalf of the Warsaw Academy), that about 20 seconds after the luminous phenomenon, a great clap of thunder, similar to a cannon-shot close at hand, could be heard; afterwards, single and separate, but less intense, reports followed. Over the entire extent of the area of fall, the inhabitants related that, before the detonation itself, a whizzing, similar to that of escaping steam, was audible." The height of the point where the bursting was seen at Sokolow Mr. Deike incidentally states as 50° and the azimuth as 15° W. of N., according to the statement of spectators there. (Refer to that position already reported before, for Sokolow, in a letter to Professor Karlinski.) In Sielc (Scheltz), on the other hand, the bursting was remarked almost in the zenith. For estimating the altitude of the point of burst, Mr. Deike availed himself of 2 sticks, intersecting at right angles. Moreover, in *The Austrian Journal for Meteorology*, **3**, p. 139, it is added that "at Sokolow, single reports, similar to platoon-fire, which lasted 5 to 10 seconds, followed the detonation. People sitting at home heard a whizzing, like escaping steam, between the flaring up and the thunder." "At Sielc, only 10 seconds elapsed between the bursting and the thunder, and one is thereby led to infer that the aerolite burst above the line which joins the village Rowy and Sielc." It may be stated further here that the falling stones distributed themselves over an elongated area, 1 mile wide and 7 miles long, which extends from the village Obryte (39° 2′.0 longitude from Ferro, 52° 42′.2 latitude) on, thru Ciolkow, Zambski, Gostkow, Rodziely, Rowy, and Sokolow, to Sielc (39° 3′.5 longitude, 52° 47′.0 latitude). "The shape of individual pieces is irregular, about like that of stones shattered by an explosion of powder; the edges are for the most part rounded off smoothly, and the outer surface is covered with a thin black or brown shell of iron oxide, under which small particles of iron are to be seen. In the interior of one of the meteorites collected was found a piece of pure iron, about a cubic inch in volume. It is to be noted finally that the sizes of the broken pieces vary greatly; thereby is revealed the surprising peculiarity that the stones found increase in size, the farther one follows along the course of the meteor; that is to say, altho, at

Obryte, the weight of single pieces amounts to only ¼ pound on the average, it reaches ½ pound at Ciolkow; 1 to 2 pounds at Gostkow and villages following it; and 3 to 4 pounds at Sielc. The largest of the pieces found up to now weighs 10 pounds and was found at Sielc, at the extreme limit of the area of fall in question." The report in Heis's *Weekly*, p. 95, names Makoff (thereby is meant doubtless only the district of Makow; refer to v. Haidinger, *Reports of the Proceedings of the Academy at Vienna*, March 12, 1868) as the place where the largest piece dropped; this stone was sent to Warsaw with a note, in which it is said: "On January 30, at 7:00 in the evening, at Makoff, 11 miles from Warsaw and near Pultusk, a terrible phenomenon occurred. The sky was clear; the thermometer read —9°. Two beautiful stars were near the Moon. Suddenly, a large number of sparks streamed from one of these stars. Thereafter it grew very dark for about 10 seconds; then one saw a large, dazzlingly bright light, similar to the light of a Bengal Fire. The inhabitants of the place emerged from their houses, since each believed that his own house was on fire; now a small, dark cloud appeared and moved from east to west [?], and at once an uncommonly loud sound was heard, the same as if a cannon had been fired, a thunder-like-rolling lasting for several minutes, and a very peculiar roaring and rattling. People conjectured immediately that a fall of stones had occurred. They searched for meteorites and found some, but most of them, probably, fell into the Narew River."

[*To be continued*]

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VARIABLE STARS

Variable Star Notes from the American Association of Variable Star Observers

By LEON CAMPBELL, Recorder

A Current Report on Milton Bureau Variables: Now that the major portion of the observing program of the Harvard Milton Bureau has been completed, there is much information of value arising from the discussion of the thousands upon thousands of photographic observations made from plates covering the past fifty years. Drs. C. P. and S. Gaposchkin have recently reported upon some of these results as discussed for variables in several of the far southern fields.

All the variables studied were photographically brighter than the tenth magnitude. More than fifty per cent of them in some southern fields had been insufficiently observed, especially with respect to period and type of variation. Little had been previously done on many of these stars since their discovery at Harvard some 30 to 40 years ago.

Although the Milton Bureau has little to contribute to the already great mass of material obained on the long-period variables by visual observers, there are a few stars of this type on which significant data have been secured.

UU Velorum, previously listed as of unknown type, is found to be a long period variable with a period of 420.7 days. The published spectrum of Me also suggests this possibility.

X Arae, with a previously published period of 353 days, is found to have a

period of half that length, or 175.0 days, the error evidently arising from the fact that the double period is so nearly a year, and the odd maxima or minima pass unobserved.

In some respects the semi-regular variables would appear to be better subjects for photographic study than is possible for visual study, especially if the plates are secured at frequent intervals over many years. Such a continuously observed light curve will enable one to determine the cycles from phase to phase more accurately than could be done from scattered observations. Any visual investigation of semi-regular variables would require a concerted program of cooperation to be carried on by several well-trained and experienced observers.

New data for some of these semi-regular variables are now available. *R Circini*, spectrum Mc and described by Miss Cannon as "rudely periodic," is found to have a mean cycle of 110 days. *θ Apodis*, spectrum Mbp and really too bright for photographic estimation, has a mean cycle of 119 days. *SZ Carinae*, a red Nb star and previously classified as unknown, has a mean cycle of 136 days. *EV Carinae*, spectrum Mb, has an undulating light curve in a period of nearly a year, not differing greatly from the nearby star *CK Carinae*, also an Mb variable with a mean cycle of about 550 days.

The red stars just cited have a constant average magnitude about which their brightnesses undulate, but several other semi-regular stars have been found which show the familiar μ Cephei characteristics of short and long term variations. Typical of this group is *W Normae*, spectrum Mb, which has a short term period of 134.7 days, and a long term period of 1304 days, a ratio of about 10 to 1, a value which, curiously enough, appears to prevail for several other variables of a similar type.

Although R Coronae Borealis-type stars are not too numerous, it is of interest to note that *RZ Normae* appears to belong in this class.

In spite of the fact that Cepheids have been more assiduously studied than the red variables, two more known variables have been found to be of the Cluster type; *W Tucanae*, period $0^d.64222988$ and spectrum F, and *V Indi*, period $0^d.47963637$, spectrum A5. A period of $0^d.479579$ for the last mentioned stars appears in the 1942 Schneller catalogue.

When, as Mrs. Gaposchkin points out, we have a series of observations extending over many years, as in the case of the Harvard plates, one may profitably study possible changes in periods of variables, especially the Cepheids. Among those in Carina there are several for which changes in period are readily detectable, such as *YZ Carinae* ($18^d.159$); *VY Carinae* ($18^d.984$) and *SW Velorum* ($23^d.51284$). However, for other Cepheids in the same period interval changes in period are not appreciable, as for example, *WZ Carinae* ($23^d.000945$); *U Carinae* ($38^d.75$) and *l Carinae* ($35^d.5323$). Additional evidence of the rapid changes of period for *κ Pavonis* has been found, thus confirming the changes previously noted by visual observers for this nine-day star; three changes in its period have been noted since Roberts made his original visual observations more than fifty years ago.

This particular southern region is especially rich in eclipsing variables. *RS Indi* proves to be a W Ursae Majoris-type star with indications of a changing period. *RR Centauri* also turns out to be a star of similar type with a changing period.

These facts, when considered in conjunction with those found to pertain for four other similar variables somewhat recently discussed by Mrs. Edith Jones

Woodward, lend color to the suggestion that, like *44i Bootis*, these stars may be multiple systems.

Three other stars, previously listed as of unknown type, have been found to be of the eclipsing type. *UU Coronae Austrinae* is a Beta Lyrae-type variable, with a period of $2^d.2379960$, alternately deep and shallow minima, and a spectrum of class A. *RX Velorum* is an Algol-type star with a period of $3^d.11182966$, a shallow secondary minimum, and a spectrum of Class A2. *RV Velorum* is also an Algol-type star, period $4^d.8810985$, with no evidence of a secondary minimum, and of spectral class G0.

New periods have been determined for two more eclipsing variables; *S Circini*, period $9^d.976596$, and *RR Normae*, period $1^d.5137710$, the latter about one half the value assigned in the Schneller catalogue.

When *DW Carinae*, assigned period $0^d.6638752$, is discussed on the basis of the double period ($1^d.3377504$) it is found to be an Algol-type star with two minima of equal depth. Also, the interval of time from principal to secondary minimum is $0^P.482$, while that from secondary to principal is $0^P.518$, indicating an appreciable eccentricity, but no evidence of apsidal motion.

TV Normae proves to be exceedingly interesting, as Hertzsprung had already pointed out. The duration of the eclipse proper for this star is exceptionally short, only 0.025 of the whole period, while the average duration of time spent in eclipse— as derived from a study of over 200 eclipsing variables—is of the order of 0.12 of the whole period.

With so few variable star data being discussed and published these days, we welcome such facts as have been here brought to light by the Milton Bureau. Fortunately, we also have the still continuing flow of visual observations as made by the members of the A.A.V.S.O., therefore we can be assured that the variables are not being entirely neglected.

Maxima of Long-Period Variables, 1944: Listed herewith are the dates in 1944 on which some of the brighter, well-known long-period variables will be at maximum. They are taken from the 1944 list of predicted dates of maxima and minima as published in a recent A.A.V.S.O. Bulletin. The magnitudes given represent the mean brightness at maximum, and the actual observed magnitudes may differ by one or more magnitudes.

Designation	Name	Date	Mag.
0010*32*	S Scl	Dec. 16	6.9
001838	R And	July 27	6.9
021143a	W And	June 29	7.3
0214*03*	o Cet	Mar. 3	3.4
023133	R Tri	Sept. 3	6.0
0250*50*	R Hor	Aug. 12	6.4
0443*49*	R Pic	June 20	6.7
"	"	Dec. 10	"
0455*14*	R Lep	June 5	7.3
054920a	U Ori	Jan. 28	6.0
0617*02*	V Mon	June 1	7.2
0652*08*	X Mon	May 22	7.3
"	"	Oct. 25	"
070122a	R Gem	Feb. 9	7.1
081112	R Cnc	May 9	6.8
0929*62*	R Car	Apr. 5	4.4
093934	R LMi	Aug. 26	7.0
094211	R Leo	Jan. 20	5.9
"	"	Nov. 28	"

Designation	Name	Date	Mag.
10066*1*	S Car	Apr. 9	5.3
"	"	Sept. 5	"
1144*41*	X Cen	June 28	7.4
1214*18*	R Crv	Aug. 17	7.4
123307	R Vir	May 7	6.9
"	"	Sept. 29	"
1324*22*	R Hya	Mar. 2	4.2
1327*06*	S Vir	Feb. 15	7.0
1409*59*	R Cen	Feb. 3 (Prim)	6.0
"	"	Sept. 5 (Sec)	"
143227	R Boo	Jan. 31	7.1
"	"	Sept. 10	"
151731	S CrB	Sept. 3	7.0
1528*49*	R Nor	Apr. 21 (Sec)	8.8
"	"	Sept. 17 (Prim)	7.3
1536*54*	T Nor	June 29	7.0
154615	R Ser	Apr. 4	6.9
"	"	Nov. 26	"
1648*44*	RS Sco	June 11	6.6
1650*30*	RR Sco	Mar. 20	6.0
"	"	Dec. 24	"
183308	X Oph	Feb. 15	6.8
190108	R Aql	Mar. 2	6.0
"	"	Dec. 28	"
1910*19*	R Sgr	June 29	7.3
193449	R Cyg	Sept. 6	7.4
194048	RT Cyg	Jan. 11	7.3
"	"	July 19	"
194632	χ Cyg	Feb. 9	5.1
1946*59*	S Pav	May 11	7.4
1949*29*	RR Sgr	Oct. 20	6.6
1951*42*	RU Sgr	Aug. 23	7.0
2338*15*	R Aqr	Apr. 23	6.4
235350	R Cas	Feb. 25	7.1
2357*15*	W Cet	Apr. 1	7.4

Observers for October: In spite of generally poor weather conditions reported from many localities, the sum total of observations received during October is commendable. The list of contributors follows:

Observer	No. Var.	No. Ests.	Observer	No. Var.	No. Ests.
Boone	6	6	Maupomé	164	172
Bouton	33	40	Meek	37	222
Buckstaff	11	15	Nadeau	95	148
Duffie	20	22	Oravec	7	21
Fernald	248	297	Parks	22	39
Garneau	16	17	Peltier	74	115
Halbach	45	57	Reeves	2	2
Harris	25	25	Rense	4	4
Hartmann	163	184	Robinson	35	63
Holt	100	145	Rosebrugh	13	75
Houston	27	55	Schoenke	34	49
Irland	23	23	Sill	83	85
Kearons	86	143	Topham	114	114
Kelly	15	19	Vohman	24	35
de Kock	65	262	Webb	9	9
Luft	7	73	Weber	100	100
Manlin	62	63	—	—	—
Mary	3	3	34	Totals	2702

December 15, 1943.

Comet Notes

By G. VAN BIESBROECK

NEW COMET VAN GENT. On December 2, the information came from South Africa that a ninth magnitude comet had been found in the southern Milky Way on November 27 by the Dutch astronomer, H. Van Gent, at Johannesburg observatory. The first information broadcast by the usual telegraphic channels read as follows:

1943 Nov. 27 at 21 hr. 15.1 min. U.T.
Right ascension 8 hr. 7.3 min. Declination —34° 14′
Daily motion —8.6 min. — 1° 13′

The fast motion indicates the comet is not very distant from the earth. So far only one further observation has become available:

1943 Dec. 3 at 10 hr. 27.2 min. U.T.
Right ascension 6 hr. 54 min. 19.7 sec. Declination —44° 38′ 46″
Giclas, Flagstaff (Arizona)

This shows that the comet has moved even faster than on the day of discovery and makes it probable that it has come nearer to the earth. From this it is, however, not yet possible to predict the future course of the comet but it will probably move into the evening sky and perhaps turn northward after a couple of weeks so that it may then come in reach of northern observers.

Two of the previously announced comets are kept under observation: periodic COMETS D'ARREST and COMAS SOLÁ. The first one is slowly fading and more and more difficult to locate. When last recorded here, November 30, it appeared as a very diffuse coma, as large as 4′ in diameter with little central condensation. The integrated light corresponded then to magnitude 15. In spite of its decreasing light it may be followed for some time yet quite close to the prediction by A. W. Recht of Chamberlin Observatory, Denver, Colorado, as follows:

1944	α h m	δ ° ′
Jan. 7	23 57.8	—16 25
Jan. 11	0 7.6	15 23
15	17.1	14 21
19	26.3	13 19
23	35.5	12 17
27	44.4	11 16
Jan. 31	0 53.2	—10 16

COMET COMAS SOLÁ is hardly brighter than the previous one but it has a well-defined nucleus and a little tail pointing southeastward. When last seen here, November 28, I estimated the magnitude as 14 and from the distance relations little change in brightness is to be expected in the coming months. The position is, however, quite favorable in the constellation of Pisces.

PERIODIC COMET SCHWASSMANN-WACHMANN I seems to have remained very faint at this opposition. During the last month I could not recognize it on plates showing stars fainter than magnitude 16.

No word has been received of the recovery of two other periodic comets, DANIEL 1909 IV and SCHAUMASSE, which are probably quite faint.

Williams Bay, Wisconsin, December 11, 1943.

Notes from Amateurs

Time Around the World

About sixty years ago the Standard Time zones, Eastern, Central, Mountain, and Pacific were established. But there are many Eastern and Mountain regions, many areas are thought of as Central, and the Pacific extends over half the longitudes.

Would it not be desirable to have names for time-zones internationally suitable? Greenwich Time, long used in navigation would naturally be maintained. From a map with meridians fifteen degrees apart names might be chosen, preferably from natural features, somewhat as follows:

When it is 12 noon in Greenwich, it would be

1	A.M. Bering Time.	1	P.M. Adriatic Time.
2	" Tahiti Time.	2	" Nile Time.
3	" Sitka Time.	3	" Caucasus Time.
4	" Cascade Time.	4	" Aral Time.
5	" Denver Time.	5	" Kashmir Time.
6	" Mississippi Time.	6	" Ganges Time.
7	" Delaware Time.	7	" Baikal Time.
8	" Trinidad Time.	8	" Celebes Time.
9	" Rio Time.	9	" Nippon Time.
10	" Azores Time.	10	" Canberra Time.
11	" Senegal Time.	11	" Caledonia Time.
12	M. Greenwich Time.	12	" Dateline Time.

The above names include 6 islands, 4 seas, 4 rivers, 4 geographical regions, and 4 cities, with names Greenwich and Dateline 24 in all.

Any local deviation from the customary Standard Time would interfere with the above nomenclature. However, if the entire world should adopt what is currently called "War Time," the correspondence would remain unaffected.

A. G.

Brooklyn, New York, November, 1943.

General Notes

Astronomical Meetings of the Ohio Neighborhood Group

The complete tentative program for the Ohio Neighborhood Group for the year 1943-44 is as follows:

Saturday, November 27, 1943—Dr. Louis G. Henyey of the Yerkes Observatory, "Galactic Nebulae." At the Warner & Swasey Observatory—Cleveland.

Saturday, February 26, 1944—Dr. Bart J. Bok of the Harvard College Observatory. At the Warner & Swasey Observatory—Cleveland.

March or April, 1944—Dr. A. N. Vyssotsky of the McCormick Observatory. At Ohio State University—Columbus, Ohio.

Saturday, May 27, 1944—Dr. Robley C. Williams of the University of Michigan Observatory. At the Warner & Swasey Observatory—Cleveland.